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COMMUNICATIONS.

Pennsylvania Board of Centennial Managers,
Philadelphia, January 1, 1878.

Hon. John Latta,
Lieutenant Governor,
President, *ex officio*, of the Senate,
Harrisburg, Pa.,

Sir: In pursuance of the Act of Assembly, approved April 12, 1875, and by direction of President McMichael, I have the honor to transmit to you, and through you to the Senate, the Final Report of the Pennsylvania Board of Centennial Managers, with Accompanying Documents, the whole being comprised in two printed volumes, octavo, under the title of "Pennsylvania and the Centennial Exposition."

Very respectfully,
Your obedient servant,
A. C. MULLIN,
Secretary.

Pennsylvania Board of Centennial Managers,
Philadelphia, January 1, 1878.

Hon. E. Reed Myer,
Speaker of the House of Representatives,
Harrisburg, Pa.,

Sir: In pursuance of the Act of Assembly, approved April 12, 1875, and by direction of President McMichael, I have the honor to transmit to you, and through you to the House of Representatives, the Final Report of the Pennsylvania Board of Centennial Managers, with Accompanying Documents, the whole being comprised in two printed volumes, octavo, under the title of "Pennsylvania and the Centennial Exposition."

Very respectfully,
Your obedient servant,
A. C. MULLIN,
Secretary.

Entered according to Act of Congress, in the year 1878,
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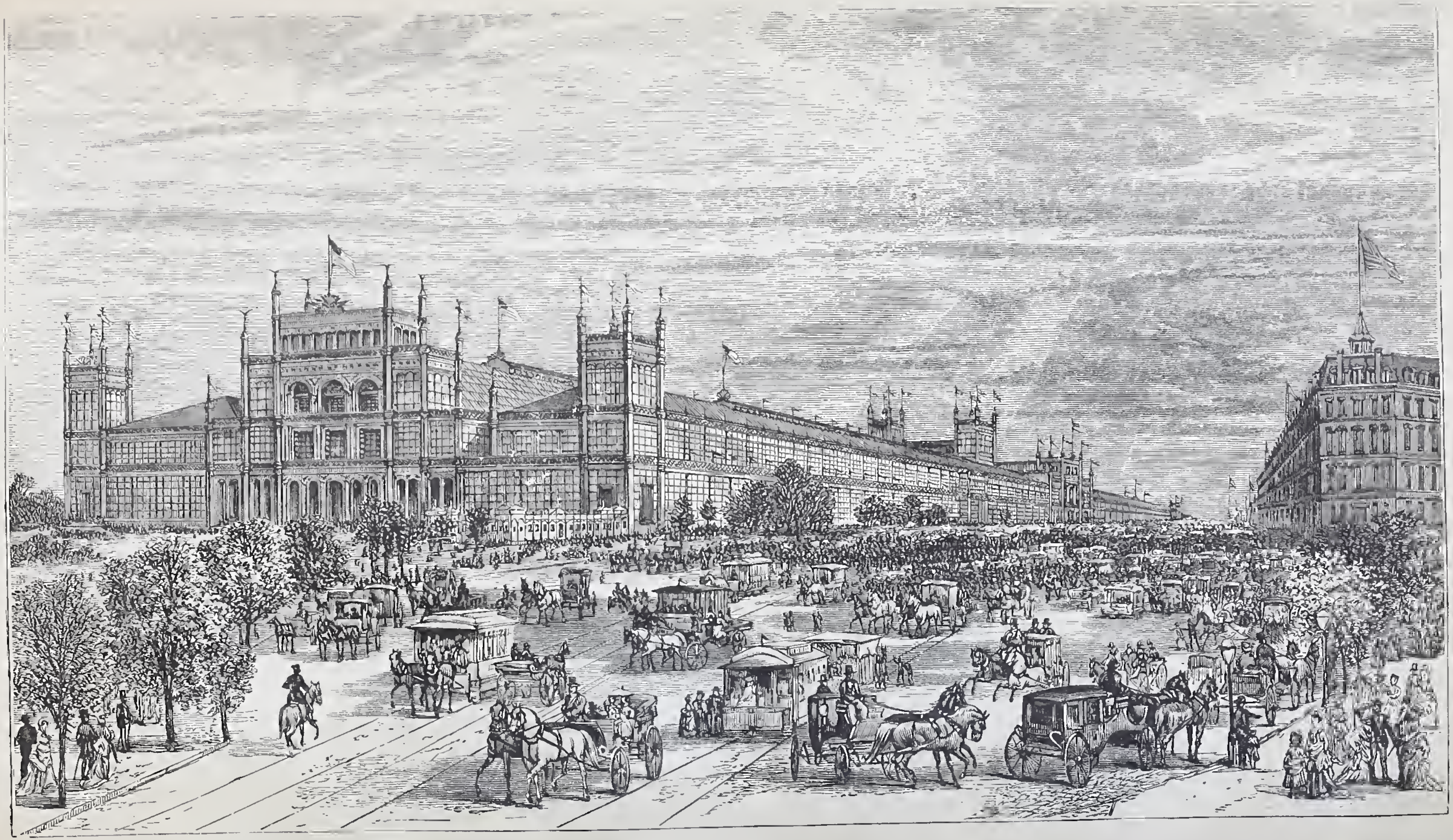

Main Exhibition Building.

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PENNSYLVANIA

AND

THE CENTENNIAL EXPOSITION:

COMPRISING

THE PRELIMINARY AND FINAL REPORTS

OF THE

PENNSYLVANIA BOARD OF CENTENNIAL MANAGERS,

MADE TO THE LEGISLATURE AT THE SESSIONS OF 1877-8;

TOGETHER WITH A LIST OF

THE OFFICERS AND MEMBERS OF THE BOARD

AND OF THE

ASSOCIATED COMMITTEES;

AN HISTORICAL SKETCH OF THE EXHIBITION;

AN ALPHABETICAL CATALOGUE

OF

PENNSYLVANIA EXHIBITORS;

AND A SERIES OF ARTICLES RELATIVE TO THE
INDUSTRIES, RESOURCES AND CAPABILITIES OF THE COMMONWEALTH.

TWO VOLUMES: THREE PARTS: ILLUSTRATED.
VOLUME I—PART I.

PHILADELPHIA:
Printed for the Pennsylvania Board of Centennial Managers,
By GILLIN & NAGLE.
1878.

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Pennsylvania Board of Centennial Managers.

OFFICERS.

MORTON McMICHAEL, President.
FOSTER W. MITCHELL, Treasurer.
ALEXANDER C. MULLIN, Secretary.

MANAGERS.

MORTON McMICHAEL, Philadelphia.
ANDREW G. CURTIN, Bellefonte.
FOSTER W. MITCHELL, Franklin.
JOHN H. SHOENBERGER, Pittsburg.
JAMES A. McCREA, M. D., Philadelphia.
DANIEL J. MORRELL, Johnstown.
ASA PACKER, Mauch Chunk.

ASSOCIATED COMMITTEES.

ADVISORY COMMITTEE.

JOHN F. HARTRANFT, Governor of Pennsylvania, Harrisburg.
M. S. QUAY, Secretary of the Commonwealth, Harrisburg.
HENRY RAWLE, State Treasurer, Harrisburg.

SENATE COMMITTEE.

Horatio Gates Jones, Philadelphia.
Butler B. Strang, Westfield.
W. S. McMullen, Oil City.
Harman Yerkes, Doylestown.
David A. Nagle, Philadelphia.

HOUSE COMMITTEE.

J. R. Thornton, Pittsburg.
J. Miles Jamison, Richborough.
Charles R. Gentner, Philadelphia.
W. H. Graham, Allegheny City.
Harry Huhn, Philadelphia.

OFFICERS OF THE JOINT MEETINGS.

MORTON McMICHAEL, President.
ALEXANDER C. MULLIN, Secretary.

SPECIAL COMMITTEES.

FURNITURE AND DECORATIONS.

Morton McMichael, Chairman,
Foster W. Mitchell,
Matthew S. Quay,
David A. Nagle,
Harry Huhn.

ON PENNSYLVANIA DAY.

Henry Rawle, Chairman,
Foster W. Mitchell,
Daniel J. Morrell,
David A. Nagle,
William H. Graham,
Ex-officio Members: { Morton McMichael,
John F. Hartranft.

STATE BUILDING.

A. C. Mullin, Philadelphia, *General Superintendent.*
Lewis G. Bull, Jr., Philadelphia, *Assistant Superintendent.*
Charles T. Durham, Montgomery County, *Janitor.*
Miss Tillie Weaver, Philadelphia, *Janitrix.*
William McDevitt, Philadelphia, *Messenger.*
Jerome C. Frisby, Philadelphia, *Janitor's Assistant.*

ON SPECIAL DUTY WITH THE SECRETARY.

William S. Barclay, Beaver County, *Clerk and Messenger of the Advisory Committee.*

PENNSYLVANIA AND THE CENTENNIAL.

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PENNSYLVANIA AND THE CENTENNIAL.

LETTER FROM THE SECRETARY TO THE PRESIDENT OF THE BOARD.

PHILADELPHIA, JANUARY 10, 1878.

Hon. MORTON MCMICHAEL, LL. D.,
President of the Penn'a Board of Centennial Managers.

SIR: I have the honor to submit herewith, under the title of "Pennsylvania and the Centennial Exposition," the compilation which, with the sanction of the Pennsylvania Board of Managers, you instructed me to prepare as an accompaniment to their Final Report.

The general features of the work are fully indicated in the accompanying table of contents, to which your attention is respectfully invited.

In the compilation of the Catalogue and the various documents connected with it, and in the presentment of all other facts and statistics, I have studiously aimed to accomplish the object which you expressed, and to produce a record which, whilst truthfully showing the noble part taken in the Centennial by Pennsylvania and her citizens, may also in some degree compensate for the want, at the Exposition, of the full and complete representation of the history, industries, resources, and capabilities of the State, which the Board had designed to present through a collective display, if the necessary funds had been provided by the Legislature in time for its preparation.

Originality is not always found in modern essays, even when asserted or pretended. It is not usually expected in compilations, and but little is claimed for this beyond the order in which its material is presented. It has been deemed expedient to divide the work into three parts. Part I embraces the Preliminary and Final Reports of the Board of Managers, and an historical sketch of the Exposition. Part II contains a series of articles on the leading industries and resources of the State. Part III is devoted to an Alphabetical Catalogue of Pennsylvania Exhibitors, and to the presentment, in various ways, of information respecting their Exhibits. It also contains an Appendix of statistics and other matter relating, respectively, to the United States, Pennsylvania, Philadelphia, and the Centennial Exposition. The difficulties and delays incident to the preparation of the Catalogue are considered in the introduction to that part of the work, and need not be dwelt upon here.

The preparation of the matter comprising Part II was, by your direction, and with the approval of your associates, confided to Mr. James M. Swank, the able and accomplished Secretary of the American Iron and Steel Association, he being the only expert whom it was deemed necessary to employ. His education and training, his thorough familiarity with the resources of the State, and an editorial experience of many years, combined with superior facilities for obtaining statistics and details, admirably adapted him to the task. The chapters on the leading industries of the State which he has contributed, and the chapter on transportation which was prepared under his direction by Mr. George W. Cope, are alike commendable for the great care, deep research, and signal ability evinced in their preparation, and they will form a most valuable addition to the industrial literature of our State.

It is due to you and your associates, to the public, and to myself to state, that, with the exception of Part II, the entire compilation, whatever may be its merits or demerits, is my own. The references I have made to a number of gentlemen, whose services in advancing the interests of the Exhibition were conspicuous, especially render it proper that I should distinctly avow this responsibility. Permit me to add, that, in these references, I have sought not to be invidious. There are scores and even hundreds of persons, residents of our own and of other States, who made valuable contributions to the Exhibition, and who are justly entitled to personal and honorable mention. But the limits of this compilation required that the list should be restricted to a few who were in various ways most truly representative of the great body of workers, and who, by common consent, were recognized as organizers and leaders of the hosts which battled in the Centennial cause, and which at last bore its banner to such glorious triumph.

Whenever they seemed worthy and reliable, I have used authorities freely. The newspapers of this City all liberally devoted time, talent, and space to descriptions of the Centennial, and I have found them highly suggestive and useful during the progress of my work. To guard against possible errors in facts and figures, I have relied upon official sources as the best means of verification. Generally speaking, official information has been readily accessible, but not infrequently its collection has been attended with great difficulty and delay. In one instance, statistics which I had sought during the Exposition, and which were promised to be furnished shortly after its close, were not, and in the nature of things could not be, obtained until more than a year afterwards.

For valuable information and official courtesies, my thanks are especially due to Mr. Frederick Fraley, Treasurer, and Mr. H. S. Lansing, Auditor, of the Board of Finance; Col. Myer Asch and Mr. Dorsey Gardner, Assistant Secretaries of the Centennial Commission; Dr. William Pepper, Director of the Medical Department; Mr. Dolphus Torrey, Chief of the Bureau of Transportation; Mr. C. Henry Roney, Secretary of the Agricultural Bureau; Mr. W. J. Cheyney, of the

Bureau of Awards; and Maj. W. A. Hoyt, Commandant of the Centennial Guard.

I am also indebted to the Bureau of Statistics, Harrisburg, the *Philadelphia Directory*, the *Ledger* and *Times* Almanacs, Smull's *Legislative Manual*, and Lippincott's *Official Guide to the Exposition*, for valuable statistics, and to Hon. J. P. Wickersham, Superintendent of Public Instruction, Hon. John B. Linn, Deputy Secretary of the Commonwealth, Mr. Warren B. Keely, Executive Clerk, Hon. J. Simpson Africa, Chief Clerk of the Department of Internal Affairs, Harrisburg, and to Mr. Martin W. Culp, Receiver in the Philadelphia City Gas Office, for important information.

It is proper that I should express here my high appreciation of the faithful services of Mr. W. S. Barclay, who, as Clerk and Messenger of the Advisory Committee, was detailed to me, and placed for several months on special duty. Nor must the services of those connected with me in the management of the State Building be forgotten. Mr. Lewis G. Bull, Jr., proved a most competent Assistant Superintendent, and Mr. Charles T. Durham, Janitor, Miss Tillie Weaver, Janitrix, Mr. William McDevitt, Messenger, and Mr. Jerome C. Frisby, Janitor's Assistant, each contributed a share in so conducting the establishment as to win for it the commendation of the public.

I have, as you are aware, for many months pursued my labors under the great disadvantage of seriously impaired health. During this time a member of my household, by acting as my amanuensis and otherwise contributing to lighten my task, has exhibited a devotion which I may well appreciate, but have no words to express. But for this seemingly providential aid, I must have failed to complete my work within the time allotted. I desire here also to acknowledge the very valuable assistance rendered to me by Mr. George W. Cope, the Assistant Secretary of the American Iron and Steel Association, who contributed material aid in the collection of important facts and statistics.

During our official intercourse I have not failed to mark the deep solicitude you have at all times manifested in the welfare of the Exposition, and in having the affairs of the Board of Managers so conducted as to make that body best subserve the noble purpose for which it was created. In the grand success which has followed, you have found a most fitting reward.

With your associates in the Board and on the Advisory and Legislative Committees, my intercourse has been most satisfactory and agreeable, and I beg through you to tender them the assurance of the warm and high regard in which I hold them both officially and personally.

I shall ever recur to the period during which I have been associated with you as one of the most interesting and instructive events in my life. The official relation which is now so soon to terminate has been made worthy of my lasting and grateful recollection by the consideration and personal kindness and encouraging words which you have so generously bestowed upon me. I fervently trust that many, many years are yet in store to crown your illustrious life, and that your future may be as prosperous and happy as your past has been honorable to yourself and useful to your fellow men.

I am, Sir,
With high regard,

Your obedient servant,

A. C. MULLIN,
Secretary.

PROCEEDINGS OF THE BOARD OF MANAGERS.

January 17, 1878.

At a meeting of the Pennsylvania Board of Centennial Managers, held at the office of the Commissioners of Fairmount Park, on the 17th of January, 1878, at 12 o'clock, noon, the following gentlemen were present: Hon. Morton McMichael, President; Hon. Daniel J. Morrell; Hon. Andrew G. Curtin; Hon. Asa Packer; and James A. McCrea, M. D.

The Secretary, Mr. Mullin, being absent, on account of illness, Mr. James M. Swank was selected to act in his place.

The final report of the Board was presented and approved, and ordered to be submitted to the Legislature.

A letter, addressed to the President of the Board by the Secretary, Alexander C. Mullin, Esq., stating the circumstances under which the final report of the Board had been prepared, and explaining its leading features, was presented and read; after which, on motion of Mr. Curtin, the following resolutions were unanimously adopted:

Whereas, a letter has been received from Alexander C. Mullin, Esq., the Secretary of this Board, to accompany its final report to the Legislature, which properly merits a formal notice at our hands, it is therefore unanimously

Resolved, that in the preparation of the preliminary and final reports of this Board, which are, with certain exceptions that he has himself indicated, the sole work of the Secretary, Mr. Mullin has shown a masterly appreciation of the requirements of the occasion; a zeal born of the most devoted enthusiasm in behalf of the Centennial Exhibition; great industry and research in the collection of information; a lawyer's judgment in unraveling intricate and involved details; the skill of an artist in selecting, classifying, and presenting facts worthy of lasting record; wonderful fortitude in undertaking and prosecuting to successful completion so great a task under the pressure of severe physical suffering; a rare conscientiousness in the discharge of duty which the gratitude of a great Commonwealth is insufficient to adequately reward: and a modesty withal which excites our highest admiration.

Resolved, that the patience, cheerfulness, and native courtesy of Mr. Mullin in his intercourse with the Board, and especially in the performance of the great labors incident to the preparation of its preliminary and final reports, deserve our individual thanks, which are hereby tendered, and make the approaching severance of our official relations an event that we will deeply regret.

Resolved, that our heartfelt sympathies go out to our esteemed Secretary in the severe illness with which Providence has seen fit to afflict him, and that we trust that his health may soon be fully restored, and that he may be spared yet many years to his family and his friends, and to the State of Pennsylvania, in the service of which he has raised for himself so noble a monument.

* * * *

Ordered, that a copy of the foregoing proceedings be furnished to the Secretary, and that, with his letter to the President, they be published as part of the final report.

POST 58, G. A. R.

PRELIMINARY REPORT.

PRELIMINARY REPORT

OF

THE PENNSYLVANIA BOARD

OF

CENTENNIAL MANAGERS.

MADE TO THE LEGISLATURE, AT THE SESSION OF 1877.

To the Honorable the Senate and House of Representatives of the Commonwealth of Pennsylvania:

Gentlemen:—The Pennsylvania Board of Centennial Managers, in accordance with the Act of Assembly under which they were appointed, have the honor to submit the following

PRELIMINARY REPORT.

The International Exhibition of Arts, Manufactures, and Products of the Soil and Mine, which was held at Fairmount Park, Philadelphia, in commemoration of the One Hundredth Anniversary of the Declaration of American Independence, covered a period of six months, commencing May 10 and ending November 10, 1876. It was formally opened and closed by the President of the United States, appropriate and impressive ceremonies being had on both occasions. All the civilized nations participated, and the Exhibition was beyond question the most thorough and comprehensive, the best appointed and managed, the greatest, grandest, most successful in all respects, which the world has ever witnessed.

Organization and Management of the Exhibition.

The work of preparing, organizing and managing the Exhibition devolved upon the United States Centennial Commission and the Centennial Board of Finance. The Commission was created by an Act of Congress, approved March 3, 1871, and consisted of two delegates from each State and Territory, nominated by the respective Governors thereof, and appointed by the President of the United States. The Commissioners held their first meeting on the 4th day of March, 1872, in the City of Philadelphia, and two days afterwards effected a permanent organization. But the experience of the first year demonstrated the necessity of having a body to provide the means requisite to carry the plans of the Commission into effect. Accordingly, an Act was passed by Congress, and approved June 1, 1872, creating the Centennial Board of Finance. Two corporators were named for each Congressional district, and four for each State and Territory at large. Subscriptions of stock were received and other preliminary duties performed in pursuance of the Act; after which the organization was completed, and the management devolved upon a Board of twenty-five Directors, selected by and from the body of the stockholders.

To the hearty and efficient co-operation and incessant labors of these two bodies—the United States Centennial Commission and the Centennial Board of Finance—must be ascribed the lustre which the Exhibition has shed upon us as a people, and the untold benefits resulting from it to our State and Nation. When we consider the vast and multifarious duties, the cares and anxieties, and the almost insurmountable obstacles which fell to the lot of those who planned and organized the magnificent display, the manner in which they performed their work compels the highest measure of our praise.

History of the Pennsylvania State Board.

In giving an account of the transactions of the Pennsylvania Board of Managers, it may be observed, primarily, that the efficiency of the Board was greatly impaired by the failure of the Legislature to furnish it with early and adequate financial aid. Of all the States, Pennsylvania, although giving with the most liberal hand to the general purposes of the Centennial, was among the latest, if not the last, to sustain the organization which she herself had specially created to arrange for a representation of her history and resources. The importance of looking after her own interests in this regard, by extending timely aid and encouragement, seems to have been singularly overlooked. That this subject may be thoroughly understood, it is proposed, whilst referring to the origin and necessity of State Boards, as auxiliaries to the Commission, and as representatives of their respective constituencies, to trace the history of the legislation creating the Pennsylvania Board, and under which it performed its functions. It will thus appear that no appropriation whatever was made until within six weeks of the opening of the Exhibition; that even then no contingent fund was provided, but that all bills necessarily contracted by the Board were required to undergo the formality and consequent delay of an auditing at Harrisburg before being paid, and then to be discharged only on warrants specially drawn therefor by the Auditor General. If this policy shall appear in itself to have been injudicious, or if, in presenting the subject, the Board shall so characterize it, they must not be accused of cherishing a captious spirit, or any disposition whatever to cast undue reflections upon the Legislature. The Board are controlled by no such influence, and they disclaim the want of proper respect for the law-making power.

Messages of Governors Geary and Hartranft.

It was early foreseen by the United States Centennial Commission, that, to ensure the success of the grand object for which it had been created, it ought not to rely wholly upon the influence and support of private individuals and associations. Amongst the first measures which it inaugurated, therefore, was one to enlist the active co-operation of the several States and Territories. A special Committee was appointed on the 28th May, 1872, to prepare a plan of action, and on the following day a circular was reported to and adopted by the Commission, addressed to the various Governors, requesting them to invite the attention of the Legislatures of their respective States and Territories to the importance of the proposed International Exhibition, and to urge them to adopt from time to time such legislation as might seem best fitted to carry out the objects of the Commission, and to appoint some capable body in each State and Territory, whose influence therein might tend to develop local interest and co-operation in the great work.

In his annual message to the Pennsylvania Legislature of 1873, after calling the attention of that honorable body to the objects and purposes of the Commission, the late Governor Geary said: "It may be well now to consider what the State may do to advance the cause." He also urged an appropriation for the purpose of securing the erection of suitable buildings for holding the Exhibition, remarking that, " since to Pennsylvania has been assigned the honor of having the celebration take place on her soil, she must and will see to it that it shall not fail."

Governor Hartranft, in his annual message to the Legislature of 1874, said: "A becoming regard for the dignity and honor of the country, we can hope, will now induce the General Government, and all the States, to extend to the Commission such material aid as will secure this enterprise from every possibility of failure. * * * It is a pleasure to observe that the different States and Territories are earnestly moving with a view to such contributions as will place the celebration not only upon a sound financial basis, but make it a successful exhibition of their various resources and industries. * * * Pennsylvania must not neglect this opportunity for the display of her rich, varied and inexhaustible products."

These recommendations and suggestions of the present Executive and his lamented predecessor were both opportune and patriotic, and were intended to promote the interests of the Commonwealth, as well as of the Centennial Exposition, by thorough, systematic, effective organization on the part of the State. They were addressed, not to the people themselves, but to the law-making power, as the representative and exponent of the sovereign will. The Legislature, during the sessions of 1873 and 1874, responded by such commendable enactments as made the generous donation of a million dollars towards the construction of Memorial Hall. But no provision was made to organize the State, and secure the representation of its wealth and characteristics, in the manner contemplated and desired by the Centennial authorities.

ACTION OF THE CENTENNIAL COMMISSION.

On the 30th January, 1875, the several States were again urged by the Commission to take part in the Exposition, and to adopt, by legislative action or otherwise, the necessary measures to empower organizations then existing, or agencies to be created for the purpose, to prepare such collective representations of their native resources and moral and political advancement as would properly illustrate the prosperity of the Union of States, and at the same time furnish for preservation in the public archives, a correct history of the birth and progress of the communities contributing to the growth and strength of the nation during the first century of its existence. Director General Goshorn, in a special communication to his Excellency, Governor Hartranft, urged the subject as one of great importance to Pennsylvania, and recommended that, to secure a full and proper representation of her products, industries, resources and history, *provision should be made during the year* 1875. It was suggested, that, whilst a large proportion of the articles to be exhibited would be provided for in a creditable manner by the manufacturers and producers, there would yet remain large classes of objects illustrative of the actual and possible products of the earth, such as minerals, soils, woods, vegetation, etc., which it was not to the interest or within the power of individuals to collect, but whose collection was nevertheless essential to a complete representation of the material and social condition of the community. It was also suggested that a historical and statistical department should be inaugurated, under State auspices, which should make a complete representation of such matters as the history of the early settlement of the Commonwealth; its physical features, climate, geographical position, government, law and punishment of crime; system of State and municipal taxation; revenue and expenditures; benevolent institutions and charities; educational, scientific, industrial, commercial, learned and religious societies; agricultural and manufacturing interests; the extent and effects of railroads and other means of transportation; growth in population and wealth; together with such other subjects as might aid in affording a summary view of the history, progress, and present condition of the State, and its contribution to the power and advancement of the Nation since the period of its establishment.

SECOND MESSAGE OF GOVERNOR HARTRANFT.

These timely suggestions of the Director General had been measurably anticipated by the Executive, not only in his annual message of 1874, from which we have already quoted, but also in that delivered to the Legislature on the 6th January, 1875. On the last named occasion, after referring to the proposed Centennial celebration, and the generous sympathy which its objects had awakened, he said: "It has been conceded from its inception, that the Exhibition must have the sanction and authority of all the States, if it would be clothed with the character of a national enterprise, and the number of the States that have already enlisted in the cause, discloses the prevalence of this opinion and the desire for harmony and unity of action. * * * We owe it to ourselves, humanity and liberty to demonstrate that the full development of a country and its resources, the education of the masses, the grandest achievements of science, the most abundant fruits of industry, the blessings of religion, and the amplest protection to life and property can all be secured by, and are consistent with, the largest share of freedom to man. * * * Is not, therefore, the interest, pride and patriotism of every American engaged to make the Centennial, in its proportions and grandeur, a true reflex of the intelligence, genius and habits of our people, the magnitude of our resources and the benefits of our institutions? This is the scope and intention of the celebration, and if we mistake not the sentiments of the people of the country, every State and Territory will be represented in the Exhibition in the manner that will best display its wealth, industries and characteristics, and with the more comprehensive view of making the Centennial truly national and American."

The Organic Act.

Having thus seasonably made this official deliverance, so entirely in harmony with the subsequent expressions of the Centennial Commission, and an appropriation of public funds being indispensably necessary to give practical effect to the object in view, it only remained for the Executive, as soon as practicable after the receipt of the Director General's communication, to transmit a copy thereof to the House of Representatives, inviting the attention of that honorable body to its importance. This was done on the 2d February, 1875, and on the 22d of the same month Mr. Vogdes, of Philadelphia, read in his place, a bill, entitled "An Act to provide for the appointment of a State Board of Centennial Managers for the International Exhibition of the year eighteen hundred and seventy-six, and make appropriation to defray the expenses thereof." The bill contained six sections, the last of which simply provided for the repeal of any legislation inconsistent therewith. Section 1 authorized and empowered the Governor to appoint five suitable persons from different sections of the State, familiar with the resources, arts, products, history and capabilities of the State, who, with the United States Centennial Commissioner and the Alternate Commissioner from Pennsylvania, should constitute the "State Board of Managers for this State." Section 2 devolved upon the Board the responsibility of organizing the State, and of securing its thorough representation in the International Exhibition; gave the Managers special charge of the interests of the State and the citizens thereof in all matters relating to the Exhibition; and required the Board to obtain and disseminate information throughout the State in regard to the purposes and objects of the Exhibition, and generally to supervise such details and arrangements as might be required for a full and proper representation of the products, industries, resources and history of the Commonwealth, in accordance with the regulations adopted by the Centennial Commission. SECTION 3 prescribed the mode of organizing the Board, regulated its meetings, and empowered the Governor to fill vacancies by new appointments. SECTION 4 directed the Board to make report to the Legislature, at each of its sessions, with such suggestions as might be deemed advisable for fully providing for the complete and proper representation of the interests of the State in the Exhibition, and for securing the hearty co-operation of the people therein. SECTION 5, the most important feature of the bill, was as follows: "For the purpose of defraying the expenses of said Board, the sum of ten thousand dollars is hereby appropriated, to be paid by warrants, drawn by the Governor on the State Treasury, for bills and accounts of the expenses of said Board, duly certified to him by said Board, and being for such objects and purposes as may have had his approval." Having gone through the usual reference and readings, the bill finally passed the House on the 13th March, 1875, as originally presented, and was sent to the Senate for concurrence. Two days later, it was reported in that honorable body, by the Finance Committee, with an amendment, and in that form passed first reading. On the succeeding day, whilst on second reading, the fifth section, namely, that making an appropriation, was, on motion of Mr. Rutan, stricken out, and the following inserted in lieu thereof:

"SECTION 5. That the Governor, State Treasurer and Secretary of the Commonwealth, shall constitute a permanent Advisory Committee of said Board, with the right to appoint its own Secretary at such compensation as it may designate, to which Committee shall be referred all communications from Governors or Executive Officers of other States of the Union, and such Committee may participate in all the deliberations of the State Board."

Thus amended, the bill passed the Senate finally on the 17th March, 1875; and being returned to the House, that honorable body, on the same day, concurred in the amendment. On the following day, the Legislature adjourned until the first Tuesday of January, 1876.

The wisdom and propriety of creating the Advisory Committee cannot be questioned. Indeed, the sequel has proved it to have been a most valuable auxiliary of the Board. But the manner of its establishment, through the substitution of the section in question, was practically the destruction of the bill itself, the vital principle of which—that proposing to furnish the means necessary to the attainment of its objects—was thereby entirely eliminated from its provisions. It may be further remarked in this connection, that, although the record shows the title to have been changed by the Senate so as to correspond with the bill as amended, yet, through some inadvertence in comparing or transcribing it, as is supposed, the bill was certified to the Executive under its original title. In that form it was approved on the 12th April, 1875; so that, as it stands on the statute book, it presents the strange anomaly of an Act purporting to make an appropriation, yet making in fact no appropriation whatever.

Organization of the Pennsylvania Board.

On the 11th June, 1875, by virtue of this Act, the Governor appointed, as Managers, Morton McMichael, of the City of Philadelphia; Andrew Gregg Curtin, of the County of Centre; John H. Shoenberger, of the County of Allegheny; George Scott, of the County of Columbia; and Foster Wilson Mitchell, of the County of Venango; thus constituting (with Daniel J. Morrell, of the County of Cambria, and Asa Packer, of the County of Carbon, the former gentleman being the United States Centennial Commissioner, and the latter the Alternate Commissioner, for Pennsylvania,) the State Board of Centennial Managers for Pennsylvania; the Advisory Committee consisting, under the provisions of the law, of his Excellency, Governor John F. Hartranft, Hon. Robert W. Mackey, State Treasurer, and Hon. M. S. Quay, Secretary of the Commonwealth.

The Managers were not unmindful of the magnitude and importance of the duties and responsibilities which their appointment imposed. It was apparent that to prepare and organize such a display as the law contemplated, and as would fitly illustrate the resources and history of Pennsylvania at the great Exhibition, would be no ordinary undertaking. They foresaw that the proper discharge of their functions would necessarily involve a large expenditure of both time and pecuniary means. Their time, and such energies as they possessed, they were willing to devote freely to the cause; but could they reasonably be expected to furnish or procure the requisite funds, in the absence of an appropriation or some guaranty of repayment on the part of the State? Under these circumstances, it is not to be concealed, the Managers at first hesitated as to the course to be pursued; but, deeply impressed with a sense of duty to the public, and sharing in the very generally expressed opinion that the Legislature would, early in the coming session, materially aid their efforts, they resolved to accept the trust and to enter upon their work.

After one or more informal meetings, at which a full interchange of opinion was had, the Board was permanently organized on the 5th July, 1875, by the election of Morton McMichael, President, and George Scott, Secretary and Treasurer. It was understood that, whilst each member was to exert his influence and efforts in promoting the objects of the Board in a general way, he was also to regard himself as specially charged with the work of encouraging proper representations and exhibits from his particular locality. The eminently fair geographical distribution which the Executive had made in appointing the Managers, admitted of an arrangement in this respect which was attended with highly satisfactory results. To ex-Governor Curtin was committed the task of urging suitable displays from the agricultural, lumber, and bituminous coal regions of the central part of the State. Mr. Shoenberger's sphere of action embraced the manifold manufacturing interests and productions of the soil and mines of Allegheny County and the south-west. The work of inducing proper exhibits of petroleum, its products, and the processes employed in connection therewith, together with the presentation of the various other industries of the north-west, was confided to Mr. Mitchell. On Mr. Scott was devolved the duty of soliciting appropriate exhibitions of the farming and stock-growing interests throughout the State, and displays from the anthracite coal mines and other sources of wealth in the north and north-east. To Mr. Morrell was intrusted the task of promoting suitable exhibits illustrative of the mining, manufacturing, and other industries along the southern tier, and in the great iron district; whilst it was left to Mr. Packer to encourage the due representation of the productions and characteristics of the teeming Lehigh Valley. It was the province and aim of the President of the Board to secure such a presentment of the resources and capabilities in the arts and sciences, and commerce and manufactures of Philadelphia and vicinity, as would fitly show the enterprise, habits and prosperity of the people, the excellence of their institutions, and the just claim of the City to distinction as the seat of the Exposition.

The better to attain these objects, a correspondence was opened and conducted with leading gentlemen in various parts of the State; documents were distributed and information freely disseminated; meetings were held at Philadelphia, Bethlehem, and other points, to stimulate local action; the co-operation of individuals and associations was urged, and everything within the power of the Board done to encourage the production of suitable articles, and to render the Pennsylvania exhibits a worthy and proper representation of her products, industries and resources.

THIRD MESSAGE OF GOVERNOR HARTRANFT.

To signalize these efforts with success, the Managers now awaited the early and favorable action of the Legislature. In his annual message, read January 4, 1876, the Executive, after referring to the appointment of the Board, and to their duties in connection with the collection and superintendence of the Pennsylvania exhibits, said: "To perform this duty it is evident they must have financial aid, and when we consider how vast and multiform must be its labors, and the short time left to discharge the same, the sum allowed to defray the expenses should be liberal, and commensurate with the important share the Commonwealth has taken in this great national enterprise. * * * I recommend that an appropriation therefor be made at once."

MEETING AT HARRISBURG.

On the 20th January, 1876, the Board met at Harrisburg. Important engagements elsewhere prevented Messrs. Morrell and Packer from being present. With these exceptions, the attendance was full. A conference was had with the Advisory Committee, and with other prominent officials and gentlemen from various parts of the State, who were interested in the success of the Exhibition. At a meeting with the members of the Legislature, the Board made a verbal report of their action, with such suggestions as were "deemed advisable for fully providing for the complete and proper representation of the interests of the State in the Exhibition, and for securing the hearty co-operation of the people therein." The efforts made by the Board, and the disadvantages under which they had labored from the want of financial aid from the State, were fully set forth and explained. It was urged, therefore, that, in view of the near approach of the Exhibition, an adequate appropriation be made immediately, to enable the Board to carry out their plans and effectuate the objects for which they had been established.

THE SUPPLEMENTAL ACT.

On the following day, a supplement to the original Act was accordingly introduced in the House, by Mr. Reighard, of Lycoming County. On the 11th February, the bill was reported favorably by the Committee on Appropriations, and, some amendments having been made, it passed third reading on the 1st of March, and was sent to the Senate. It was there further amended, and whilst on third reading, on the 27th March, was defeated. This action, however, was reconsidered on the following day, and the bill finally passed; and the House having concurred in the Senate amendments, it received the approval of the Executive on the 30th March, 1876.

By this supplement (SECTION 1) it was enacted, that, for the purpose of enabling the Board to fulfill the purpose of their appointment and perform the duties imposed upon them by the Act of April 12, 1875, the sum of forty thousand dollars is appropriated. SECTION 2 requires the Board, immediately after the passage of the Act, to cause to be erected, on the grounds of the Centennial Exhibition, a suitable building for the accommodation and convenience of the people of Pennsylvania, which shall be furnished and provided with proper attendants during the period the Exposition shall remain open. SECTION 3 directs that the money shall be paid only as required, and after proper vouchers are filed, certified by the President of the Board, and settled in the office of the Auditor-General; with a *proviso*, that no part of the money shall be paid the Commissioners as compensation; and instructing the Board, at the expiration of the Exhibition, to sell said building and furniture, and return the proceeds to the State Treasurer. SECTION 4 enacts, that, before any contract for the erection of the building shall be made, the contractor therefor shall execute a bond with sufficient sureties, conditioned for the completion of the same before the day of the opening of the Exhibition, said bond to be approved by the Advisory Committee of the State Board on behalf of the State; the expenses of said Advisory Committee, as authorized by the fifth section of the Act of April 12, 1875, to be paid on the warrant of the Governor; with a *proviso*, that a Committee of five from the Senate and five from the House of Representatives, to be appointed by the

Speakers, are hereby authorized to act in conjunction with the State Board of Centennial Managers and the Advisory Committee of the State Board, in the construction and general management of the building authorized to be erected.

Preliminary Steps towards erecting the State Building.

Under the provisions of this supplement, it will be observed, the time allowed for the erection of the State Building was but forty days,—in fact, excluding Sundays, but thirty-four days,—namely, from March 30, when the bill became a law, to May 10, the day fixed for the opening of the Exhibition; and it was expressly required, that, before any contract should be made, the contractor should give bond and security for the completion of the structure within that period.

Manifestly, if no preparations had been made in advance, a rigid adherence to the provisions of this supplement would have prevented the erection of the Building altogether. But the Board had anticipated the appropriation in this respect, and having regard to the spirit rather than the strict letter of the law, they were thus enabled to bring within the range of possibility an undertaking which would otherwise have been impossible. Long prior to the introduction of the supplement, the plans and specifications were in readiness, and proposals had been received for the construction; so that, when the bill became a law, this preliminary action greatly facilitated the placing of the work under contract.

Proposals had been made by three different parties, that of Messrs. Peters & Burger, of Lancaster, being the highest. One of the lowest bidders, however,—before the requisite authority to execute a contract had been conferred upon the Board, and in view of the limited time which would be allowed for the completion of the Building,—withdrew his proposition altogether, whilst the other increased his bid to the sum of twenty thousand dollars ($20,000). Under these circumstances, Messrs. Peters & Burger expressing a willingness to perform the work at their original offer, namely sixteen thousand seven hundred and seventy-five dollars ($16,775), there remained no alternative but to award them the contract. These gentlemen had enlarged experience as contractors and builders, and possessed ample force and supplies of workmen and materials. They executed a bond in the sum of ten thousand dollars ($10,000),—the amount fixed by the Board,—with two sureties, conditioned for the fulfillment of their contract in the time stipulated; and relying on the faith of the State as pledged to them through the Managers, they earnestly and vigorously commenced operations. Meantime, the bond was forwarded to the Advisory Committee at Harrisburg, and as soon as the Board were apprised of its approval, the contract was formally executed.

The Legislative Committees.

The gentlemen composing the Legislative Committees created by the supplement, were certified to and recognized by the Board as follows:

SENATE—Hon. Horatio Gates Jones, Philadelphia, Chairman; Hon. Butler B. Strang, Tioga County; Hon. W. S. McMullen, Venango County; Hon. Harman Yerkes, Bucks County; and Hon. David A. Nagle, Philadelphia. HOUSE—Hon. J. R. Thornton, Allegheny County, Chairman; Hon. J. Miles Jamison, Bucks County; Hon. Charles R. Gentner, Philadelphia; Hon. Willam H. Graham, Allegheny City; and Hon. Harry Huhn, Philadelphia.

CHANGE IN THE SECRETARYSHIP.

It must be here remarked, that, in consequence of his private and personal engagements, and in view of the exactions which would necessarily be made on his time during the Exposition, Mr. Scott, on the 23d day of March, asked to be relieved from his duties as Secretary. It was plain, that, if the supplement then pending were passed, the office would require unremitting attention to discharge its functions properly; and it was a question whether, being a Manager, and as such denied compensation, any allowance whatever could be made him in return for the sacrifice which his continuance in the secretaryship would entail. It seemed eminently proper, therefore,—the office being held "during the pleasure of the Board,"—that Mr. Scott's request should be complied with. Accordingly, as soon as the supplement was approved, he was relieved, and the responsibilities of the secretaryship were intrusted to Alexander C. Mullin, of Schuylkill County. Mr. Mullin at once removed to Philadelphia, and entered upon his duties, being kindly furnished with room in the office of the Centennial Commission, where the business of the Board was transacted until quarters were provided in the Pennsylvania Building.

DEATH OF MR. SCOTT.

On the 10th of April, 1876, at Hazleton, Pa.,—but a few days after his release from the cares of the secretaryship,—Mr. Scott was suddenly and unexpectedly stricken down by the unsparing hand of death. A native of this State, having been born at Wysox, in Bradford County, February 21, 1814, he had during his life filled many public positions. As early as 1837, he was appointed, by Governor Ritner, Major of the 15th Regiment of Pennsylvania Militia. In 1853-54, he was a member of the House of Representatives. He was Canal Commissioner in 1857-58, and was again a Representative in the House in 1869-70. In addition to his membership in the State Centennial Board, he held, at the period of his untimely demise, the Presidency of the State Agricultural Society, an Associate Judgeship of the Courts of Columbia County, and the Presidency of the Catawissa Bank, besides other public and private offices of trust and honor. As husband, parent, citizen—indeed, in all the relations of life—he acted well his part; and he died as he had lived, respected and beloved by all who knew him.

CHANGES IN THE BOARD AND ADVISORY COMMITTEE.

At a special meeting of the Board, held April 29, 1876, at Philadelphia, an appropriate minute of Mr. Scott's decease was made, and Mr.

Mitchell was unanimously elected to succeed him as Treasurer. The vacancy in the Board was filled by the appointment of Dr. James A. McCrea, of Philadelphia, his commission from the Governor bearing date April 28, 1876, and he being admitted to his seat on the following day. There are no other official changes to note, except that, when Mr. Mackey ceased, May 1, 1876, to be State Treasurer, his place in the Advisory Committee was filled by Hon. Henry Rawle, his successor in office.

First Joint Meeting.

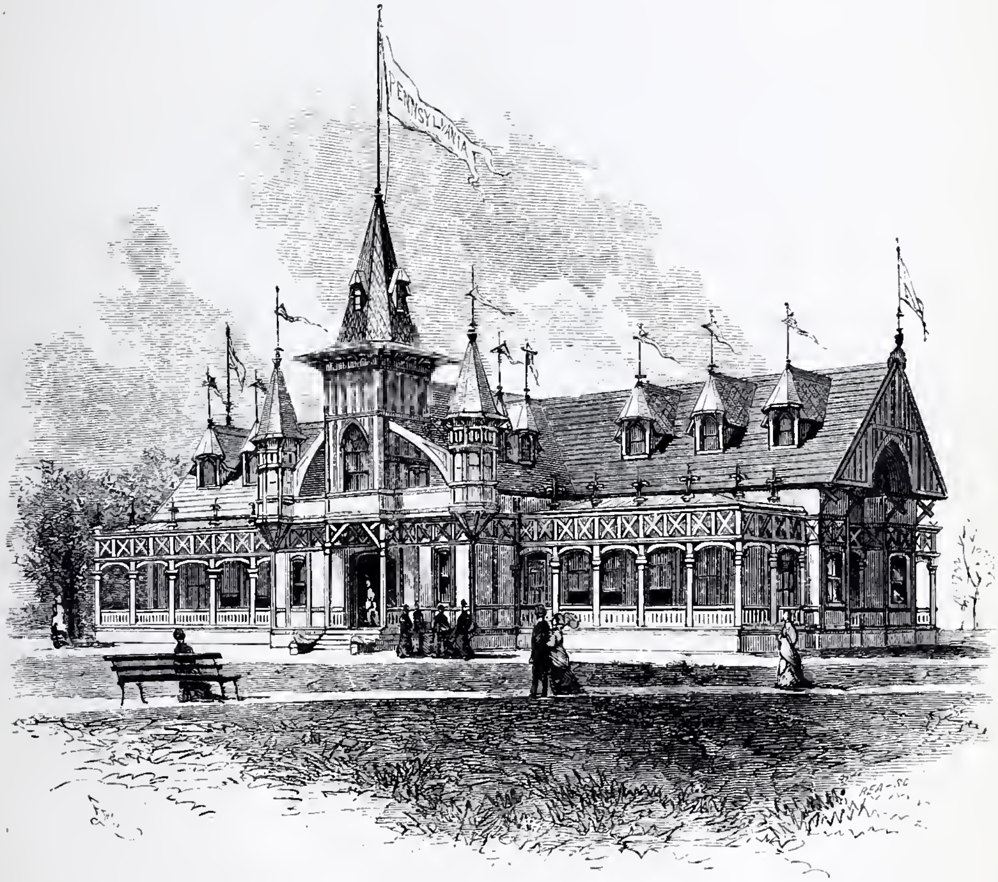
The first joint meeting of the Board and associate Committees was held at Philadelphia, on the 29th April, 1876, the President and Secretary of the Board being the officers thereof. The attendance was large, and a full interchange of opinion was had. The President having laid before the meeting the plans and specifications relative to the State Building, and stated the price, to whom, and the circumstances and conditions under which the contract had been awarded and executed, the action of the Board was, on motion, unanimously approved. Amongst other business transacted at this meeting, a motion was adopted, under which the President and Mr. Mitchell, of the Board; Mr. Quay, of the Advisory Committee; Mr. Nagle, of the Senate Committee; and Mr. Huhn, of the House Committee, were constituted a Committee to procure necessary furniture and decorations, with discretionary power also to have the Building insured.

Completion of the Building.

Although the best efforts of the contractors were put forth, it was impossible to have the Building entirely completed within the time stipulated. But it was so far advanced, that, on the opening day of the Exhibition, the ensign of Pennsylvania floated from the staff on the central tower, whilst the Managers' Room was placed in the occupancy and under the control of the Secretary of the Board. A few days more were required to complete the painting and furnishing of the structure, and the proper embellishment of its surrounding grounds. This time was so well employed, that when, two weeks later, the Board and Committees convened under its protecting roof, the edifice presented a marvelous illustration of the progressive spirit and wondrous capabilities of the age. The result was alike creditable to the taste and skill of the architect, the enterprise and energy of the contractors, and the patriotism and liberality of the people of our State.

Officers and Attendants at the Building.

On the 24th May, 1876, the Board and associate Committees took possession of the Building, prescribing the regulations and appointing the force necessary for its proper management and control. The general superintendence was conferred upon the Secretary, with the following named assistants, nominated by the Legislative Committees and afterwards confirmed in joint meeting, namely: Assistant Superintendent, Lewis G. Bull, Jr., Philadelphia Janitor, Charles T. Durham, Montgomery County;



PENNSYLVANIA STATE CENTENNIAL BUILDING.

(See page 13, Part I.)

Janitrix, Mrs. Mary Smith, Philadelphia; Messenger, William McDevitt, Philadelphia. All the appointees, except Mrs. Smith, immediately entered upon their duties. She failing to report, Miss Tillie Weaver, of Philadelphia, appeared and discharged the duties of Janitrix, and was subsequently duly recognized as the rightful occupant of the position. Jerome C. Frisby was afterwards appointed an assistant to the Janitor; and William S. Barclay, of Beaver County, having been appointed Clerk and Messenger to the Advisory Committee, was specially detailed to and placed on duty with the Secretary.

Settlement with the Contractors.

Some essential changes and modifications in the original plan of the Building having been adopted, the contractors, at this meeting, presented a bill for extra work and materials, amounting to six hundred and eighty-two dollars and a half ($682.50). The correctness of this bill had been certified by Mr. H. J. Schwarzmann, the architect; but objection being taken to the amount as excessive, a Committee of three, consisting of Messrs. Huhn, Jones and McCrea, was appointed to examine and report upon the subject, pending which the contractors were to be paid twelve thousand dollars ($12,000) on account of the sum named in the contract.

The report of this Committee was made by Messrs. Huhn and McCrea, and being adverse to the allowance of more than two hundred and twenty-five dollars ($225.00), as in full payment of the claim for extra work, the contractors insisted upon their rights under the fifth specification annexed to the contract, which provides, that, "should any dispute arise respecting the true value of the extra work, or of the works omitted, the same shall be valued by two competent persons—one employed by the owner and the other by the contractor—and these two shall have power to name an umpire, whose decision shall be binding on all parties."

Accordingly, on the 29th of June,—the contractors having named Mr. Charles Palmer as the arbiter on their part,—Mr. R. J. Dobbins was selected by the President to act in behalf of the Board. Mr. Dobbins declined, however, and Mr. Thomas H. Doan was, on the 5th of August, appointed in his stead. On the 10th of the same month, the referees, having made their examination, reported, in writing, "the work as well done, and the charges for the same correct."

There could be no question as to the ability or integrity of the gentlemen selected to perform this duty, and therefore when, at a joint meeting of the Board and Committees, held on the 30th of August, attention was called to their report, a motion was at once made and unanimously carried, that the bills of the contractors be paid as originally presented.

Description of the Pennsylvania Building.

The Pennsylvania Building is situated north of the Avenue of the Republic, and fronts on the western or upper end of the largest of the chain of lakes in the Centennial Grounds. The entire superstructure is built of wood, in strictly Gothic architectural forms. The extreme dimensions are 68 feet 6 inches east and west, and 104 feet 6 inches north and south. The ground plan gives a large hall in the centre, 30 feet by 54 feet. This hall, the floor-area of which, exclusive of the vestibule, is 180 square yards, is open to the roof, (which is supported by Gothic arch trusses with elaborately turned wood work), and presents a chapel-like appearance. In the south wing, immediately to the left of the main entrance, is the Board of Managers' Room, and adjoining it on the west side is the room set apart for the Governor. These rooms are respectively 20 feet by 26 feet, and each communicates with the other and with the main hall. In the north wing, immediately to the right of the main entrance, is the Gentlemen's Parlor, 20 feet by 20 feet, and adjoining it on the west, and of equal dimensions, is the Ladies' Parlor. These parlors communicate with the main hall but not directly with each other, and each is provided with toilet-rooms, containing wash-basins, water-closets, etc. In the front, and facing the lake, are three small rooms, the centre one being the vestibule. On the east and west sides are located porches, 6 feet wide, making returns toward both ends, of the same width. From the room north of the vestibule, a stairway leads to a gallery, which is open to the main hall and also to the outside of the building. The structure is gabled on all four sides, that on the east having a central and two side towers. The roof, which is of slate, is ornamented on the side with dormer windows, which are in turn ornamented with rods and balls and other devices. The construction is entirely of white pine. The coloring of the exterior is a pale drab, with broad stripes of brown, edged with chocolate picked out in carmine; that of the interior is a light yellowish brown, with lines of Prussian blue, the ceilings being relieved by flower work in chocolate color.

Furniture and Conveniences.

The floor of the main hall is covered with Chinese matting, which, during the intense heat of summer, was pleasingly suggestive of coolness, and well harmonized with the cane-seated settees and chairs, bordering upon the walls, or placed beside the ample supply of writing-tables intended for public convenience. A register for visitors, a clock, a thermometer, a place for bulletins, numerous railroad time-tables, a letter-delivery, etc., were features in this hall; and amongst its other objects of entertainment and interest, were several fine photographic views from the Gutekunst Gallery, and an elegant upright piano from the Schomacker Piano Manufacturing Company, which were generously loaned by these establishments during the period of the Exposition. The floor of the vestibule is covered with cocoa matting; the small room to the south of it was fitted for the deposit and care of coats, valises and other parcels, for which checks were given to the owners. The four principal rooms are carpeted with English Brussels, the pattern in each being different from that in the others. The suite of furniture in the Governor's Room is of walnut and blue velvet plush. The Managers' Room, in which the Secretary had his office, and where all the business of the Board was transacted, is furnished in walnut and Magenta rep, and the Ladies' and Gentlemen's Parlors in walnut and green and maroon reps, respectively. In addition to writing-tables, the Gentlemen's Parlor contained files of the newspapers received at the Building. The Ladies' Parlor (which was specially in charge of the Janitrix), possessed similar advantages, and had, amongst other attractions, a superior cabinet organ, kindly placed there for the occasion by the Burdett Organ Company, of Erie, Pennsylvania. The entire Building is lighted with gas, reflecting chandeliers being employed in the hall and principal rooms, and ordinary burners elsewhere as required. There are no flues in the Building, but after the advent of cool weather early in October, visitors were made comfortable by means of a large stove placed in the main hall, the pipe being securely passed through the crest of the arched roof.

The Location Misunderstood.

POST 58, G. A. R.

For a considerable time the location of the Pennsylvania Building was very generally misunderstood by the public. The site originally intended is on the corner of Belmont and State Avenues, immediately east of the Ohio State Building. But, in view of the great work done by Pennsylvania for the Exposition, it was determined by the Centennial authorities that her State Building should have a more eligible and pleasant situation. The fact that most of the published maps reported the original location, only served to increase the general misapprehension. After the opening of the Building, however, a circular was addressed to the newspaper press of the State, calling attention to the comforts and conveniences which it was intended to afford, and describing its locality. Very general publicity was given to this circular; and the State flag, or a burgee bearing the name of "Pennsylvania," being regularly displayed from the principal tower, whilst a large keystone, similarly inscribed, was conspicuously shown over the main entrance, all doubt and difficulty in ascertaining the true location of the Building was gradually removed.

Register for Visitors.

The registration of visitors at the Pennsylvania Building commenced on the 24th May, and ceased at the close of the Exhibition, November 10. The aggregates of the several months were as follows:

May 24th to May 31st	568
June	4,606
July	5,641
August	7,678
September	16,048
October	18,036
November 1st to November 10th	7,872
Whole number registered	60,449

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It is to be observed that the item for November embraces the names of the Pennsylvania Board of Centennial Managers and associated Committees, the United States Centennial Board of Finance, and members of the Pennsylvania Legislature of 1876, who registered at various times during the Exposition on space specially provided in the register.

Dividing the whole number registered by 147, the number of secular days from May 24 to the close of the Exhibition, the average daily registration appears to be a fraction over 411. Of the whole number registered, the Assistant Superintendent, who supervised the registry, estimates that about 10 per cent. (6,045) are non-residents of Pennsylvania; 20 per cent. (12,090) are Philadelphians; and the remaining 70 per cent. (42,314) are Pennsylvanians residing outside of Philadelphia The largest number registering in any one day was on the 28th of September—Pennsylvania Day—when 3,067 names were enrolled. The next largest number (1,567) was on the 9th of November, the day next preceding that on which the Exhibition closed. The third in importance was October 19th, when Maryland, Delaware and the Virginias held their jubilee, and, amongst other attractions, recalled the days of chivalry by a grand tournament in Fairmount Park. On that occasion 1,125 names were recorded. On the morning of November 10, the day on which the Exposition terminated, the registration promised to be large, but the weather proved rainy and disagreeable, and most of the visitors were so occupied with the closing ceremonies, and so intent upon taking a "last, lingering look" at the many curious and beautiful sights which were so soon to be lost to them forever, that they evinced a marked indifference about the matter of registration; hence, the number enrolled on the closing day only reached 1001.

The register, it may be remarked, could not at all times be regarded a reliable criterion to govern estimates as to the number of visitors either on the grounds or at the Pennsylvania Building. On some occasions, when the aggregates of admissions were amongst the highest, and the number of visitors at the Building correspondingly large, the registrations were comparatively few; and *vice versa.* As a general rule, the registration bore but a small proportion to the actual number of visitors. Thus, on Pennsylvania Day, 3,067 names were registered, yet it is estimated that on that occasion not less than 40,000 persons passed through the Building, whilst a much larger number eagerly sought admittance, but could not obtain it. Indeed, from 2 P. M. to 5 P. M., whilst the Governor's reception was in progress, every room in the edifice was so densely thronged with human beings that registration became an impossibility, and had to be entirely abandoned until the ceremony was over; after which, probably fifty names were added to the list. The registrations of other notable days might be introduced and commented upon in this connection, but it is not deemed essential. After careful observation and comparison, it has been estimated by the Secretary and his assistants, (and the Board concur in the opinion), that the ratio of registrations would be to the total of visitors as 1 is to 6, which would give the enormous number of 362,694 persons who visited the Pennsylvania Building from the time it was thrown open to the public until the close of the Exhibition.

It will be observed that the number registered in September is largely in excess of that of any preceding month. This is to be ascribed partly to the increased number of visitors, and partly to the fact that, on Pennsylvania Day, a new system of registration was inaugurated. Prior to that time, the names were required to be written in a single volume, and the progress of the work was greatly hindered and retarded by parties conning over its pages in quest of names of distinguished personages, or of relatives or personal friends. On and after Pennsylvania Day separate blanks were employed, so that, when necessary, several parties were enabled to register simultaneously. The detached leaves were carefully preserved, and afterwards bound together. This plan proved much more successful and acceptable than the other. The object of the register was not so much that it might be used as matter for present reference; it was rather, that, being kept in a decent and orderly manner, it might be deposited in the archives of the State, and be transmitted to posterity as an interesting and valuable *souvenir* of the Centennial. The officials charged with its supervision were instructed, therefore, to see that, as far as possible, registrations were made in good faith, and that any and all attempts to record notorious or fictitious names, or to indite upon its pages offensive or questionable remarks, should be promptly repressed. The practice of defacing such records, or of impairing in any wise their verity, cannot be too strongly reprehended. Permitted in a single instance, it will not long lack imitations. The vulgar resort to it without scruple; others, not inherently vicious, indulge in it through mere indiscretion. It is commendable that such graceless attempts were rare at the Pennsylvania Building, and that, through the timely vigilance of the officers in charge, they were almost invariably frustrated. The register may, therefore, be regarded as having subserved the purpose for which it was designed, that of a reliable and truthful record, and the many thousands, whose names appear therein, are to be congratulated that few have marred its pages with anything which they or their friends might in after years have occasion to regret.

THE THERMOMETER.

The summer of 1876 will be remembered as exceptionally and almost continuously hot—the hottest, indeed, known in this country for many years. From the 21st June to the 30th September, thermometrical observations were carefully made and noted at the Pennsylvania Building every day, (except Sundays), at 9 A. M., 12 M. and 3 P. M. The following table, showing the various degrees marked by the mercury, with the average daily temperature during the period indicated, may prove valuable as a record, and interesting for purposes of comparison:

THERMOMETRICAL REGISTER.

1876.		9 A. M.	12 M.	3 P. M.	AVERAGE.
Wednesday	June 21	73	75	77	75
Thursday	“ 22	69	76	77	74
Friday	“ 23	72	80	82	78
Saturday	“ 24	80	85	87	84
Monday	“ 26	82	87½	92½	87⅓
Tuesday	“ 27	85	90	93	89⅓
Wednesday	“ 28	82	87	91	86⅔
Thursday	“ 29	79½	83½	86	83
Friday	“ 30	79	83	87	83
Saturday	July 1	78	83	88	83
Monday	“ 3	83½	87	89½	86⅔
Tuesday	“ 4	84	89	91	88
Wednesday	“ 5	83	88	92	87⅔
Thursday	“ 6	78	88	86	84
Friday	“ 7	80	86	88	84⅔
Saturday	“ 8	84	91	96	90⅓
Monday	“ 10	84	90½	89	87⅚
Tuesday	“ 11	85	89½	93½	89⅓
Wednesday	“ 12	83	86	93	87⅓
Thursday	“ 13	86	90½	80½	85⅔
Friday	“ 14	78	85	87	83⅓
Saturday	“ 15	82	87	91	86⅔
Monday	“ 17	80	86	89	85
Tuesday	“ 18	81	86½	91½	86⅓
Wednesday	“ 19	83	90	94	89
Thursday	“ 20	86	93	95	91⅓
Friday	“ 21	79	82	84	81⅔
Saturday	“ 22	76	81	85	80⅔
Monday	“ 24	70	72½	75	72½
Tuesday	“ 25	68½	74	74	72⅙
Wednesday	“ 26	69	73	75	72⅓
Thursday	“ 27	72	77	82	77
Friday	“ 28	76	82	84	80⅔
Saturday	“ 29	78	81	84	81
Monday	“ 31	66	69	69½	68⅓
Tuesday	Aug. 1	70	75½	76	73⅚
Wednesday	“ 2	69½	72	74½	72
Thursday	“ 3	68½	71½	72	70⅔
Friday	“ 4	70	77	78	75
Saturday	“ 5	70	79	81	76⅔
Monday	“ 7	82	87	91	86⅔
Tuesday	“ 8	81	85	88	84⅔
Wednesday	“ 9	80	84	87	83⅔
Thursday	“ 10	79	83	87	83
Friday	“ 11	78	83	85	82
Saturday	“ 12	75	81½	83½	80
Monday	“ 14	77	81	81	77⅓
Tuesday	“ 15	80	84	88	84
Wednesday	“ 16	79	83	87	83
Thursday	“ 17	77	80	89	82
Friday	“ 18	75	79	80	78
Saturday	“ 19	73	77	79	76
Monday	“ 21	63½	68½	72	68
Tuesday	“ 22	65	73	79	72⅓
Wednesday	“ 23	69½	77	82½	76⅓
Thursday	“ 24	72	80	84	78⅔
Friday	“ 25	78	83	87	82⅔
Saturday	“ 26	70	76	79	75

1876.	9 A. M.	12 M.	3 P. M.	AVERAGE.
Monday Aug. 28	70	78	79	75⅔
Tuesday " 29	72	77	82	77
Wednesday " 30	75½	84½	85	81⅔
Thursday " 31	74	77½	84½	78⅔
Friday Sept. 1	79	87	89	85
Saturday " 2	70	74	76	73⅓
Monday " 4	67	75	79	73⅔
Tuesday " 5	65	68	71	68
Wednesday " 6	65	69	70	68
Thursday " 7	63½	64	66½	64
Friday " 8	67	74	81	74
Saturday " 9	68	75	77	73⅓
Monday " 11	59	61½	64½	61⅔
Tuesday " 12	64	67½	67½	66⅓
Wednesday " 13	65½	72	74	70½
Thursday " 14	70	74½	76	73½
Friday " 15	66	71	74	70⅓
Saturday " 16	62	65	67	64⅔
Monday " 18	69	73	72	71⅓
Tuesday " 19	65	72	75	70⅔
Wednesday " 20	68	73	74	71⅔
Thursday " 21	63	69	70	67⅓
Friday " 22	60	64	64	62⅔
Saturday " 23	62	65	66	64⅓
Monday " 25	62	69	71	67⅓
Tuesday " 26	63	65	69	65⅔
Wednesday " 27	55	61	66	60⅔
Thursday " 28	56	59	68	61
Friday " 29	62	70	71	74⅓
Saturday " 30	59	61	60	60

The average temperature for the period during which the foregoing observations were made, namely, from June 21st to September 30th, (both inclusive), is 77¼°. Thursday, July 20th, is shown to have had the highest average (91⅓°), and Saturday, July 8th, the next highest (90⅓°), though the mercury at one time rose higher on the 8th than on the 20th. On the last named day, at 3 P. M., it registered 95°, whereas on the 8th, at the same hour, it registered 96°, and although not so indicated by the above table, it was observed at 4 P. M. to have reached 97°. In fact, with the solitary exception of Sunday, July 9th, when the thermometer registered 103° in Philadelphia, Saturday, July 8th, was the hottest day of the season, the maximum being 99° in the shade at the Cooper Institute in New York, and still higher at Washington, Baltimore and Philadelphia.

It was a subject of common remark, during the heated term, that the temperature was lower at the Pennsylvania Building than elsewhere on the Centennial Grounds, or in the City. The figures would appear to corroborate this opinion, and if a difference really existed, it must be ascribed to the admirable location of the structure, its slate roof, high ceilings, and superior ventilation, and to the fact that the atmosphere in the immediate vicinity was in some degree subject to the cooling influence of the neighboring lakes and fountains. The instrument used was Fahrenheit's, of approved make and was so placed in the main hall as not to be unduly controlled by air currents or other extraneous causes.

Newspapers and Periodicals.

The following is a list of the newspapers and periodicals gratuitously forwarded to the Pennsylvania Building, and regularly kept on file during the Exhibition:

PUBLICATIONS.	PUBLISHERS AND PROPRIETORS.	WHERE PUBLISHED.	
The Press (daily)	John W. Forney	Philadelphia,	Pa.
Commercial Times	Wallington & Co	"	"
Centennial Journal	H. W. Crotzer	"	"
Frankford Gazette	Wm. F. Knott	"	"
Public Spirit	Dr. W. T. Robinson	Hatboro,	"
Delaware County Democrat	W. Cooper Talley	Chester,	"
Evening News	W. A. Todd	"	"
Bethlehem Times	D. J. Godshalk & Co	Bethlehem,	"
Globe	A. L. Guss	Huntingdon,	"
Herald	McGinley & Wiley	Elizabeth,	"
Times	John M. Bowman	Mt. Union,	"
News	D. K. & J. C. Wagner	Shippensburg,	"
American Standard	W. H. Miller	Uniontown,	"
Illustrated Newspaper	Frank Leslie	New York,	N. Y.
Chimney Corner	"	"	"
Illustrirte Zeitung	"	"	"
Days' Doings	"	"	"
Lady's Journal	"	"	"
Boys and Girls' Weekly	"	"	"
Popular Monthly	"	"	"
Lady's Magazine	"	"	"
Boys of America	"	"	"
Pleasant Hours	"	"	"
Budget of Fun	"	"	"
Jolly Joker	"	"	"
Daily Graphic	The Graphic Company	"	"
Trade Journal	Francis S. Bryant	"	"
Commercial Gazette	Ricker & Thomas	St. Louis,	Mo.
Journal	O. G. Wall	Lanesboro,	Minn.
Palladium	M. T. Hatch	North Troy,	Vt.

The management did not subscribe for any newspapers or periodicals, the number published being quite too large to patronize all, and it being deemed unwise to make distinctions. To the gentlemen named in the foregoing list, the thanks of the Board are, therefore, eminently due, and are hereby tendered, with the assurance that, through their patriotic liberality, they contributed in no small degree to the edification and entertainment not only of visitors, but of all connected with the Pennsylvania Building.

Advantages of the Building.

The situation of the Pennsylvania Building gave it many advantages during the Exposition. The Pennsylvania Railroad Centennial Depot and the City Passenger Railway Concourse were not far distant, and the Narrow-gauge Railway, which carried passengers all around the grounds, had one of its stations but a few steps from the main entrance of the

Building. Almost the entire distance from the eastern end of the Main Building to the Pennsylvania Building could be traveled under roof. These were manifest advantages during hot or inclement weather.

The surrounding grounds were beautifully laid out in grass-plots, with gravel-walks and shrubbery, and were still further adorned with beds of rich flowers. During the summer and early autumn, the views from all sides of the Building were exceedingly fine. From the porches on the west might be seen the Turkish Bazaar, the English Cottages, the various State Buildings, the Catholic Fountain, with countless other objects of beauty and interest, and, beyond all these, the picturesque George's Hill and its proudly towering observatory. From the balconies on the east the prospect was still more attractive, embracing all the principal Exposition Buildings and other unique and pretty structures, with imposing statuary, lovely green slopes, and beautiful flowers and shrubbery. These, with the charming lake and its superb fountain in the foreground, the whole relieved by the tall trees of the Lansdowne valley, formed a picture upon which the eye could rest with a pleasure and satisfaction which cannot be described.

These, however, were not the only advantages and attractions possessed by the State Building. Pennsylvanians could there meet and converse with their friends; write and receive letters; have their lunch-baskets and parcels checked and cared for; observe the time of day and the registrations of the thermometer; consult the various railroad time-tables; read the newspapers and special bulletins relative to the Exposition, and other matters of interest; obtain information respecting the numerous bureaus and departments, or the location of any of the buildings or exhibits; and in case of necessity have the attendance and advice of special messengers in prosecuting their researches.

A bountiful supply of ice-water was at all times provided. This was a most grateful feature in hot weather. During this period the Building was indeed a favorite resort. Men, women and children alike availed themselves of the protection and cooling influence of its well-ventilated halls and shady porticoes. They brought with them their luncheon, and sat down and enjoyed it as peacefully, and apparently with as much relish as though they had been assembled around their own hearth-stones. Others, weary and travel-worn, with visions which seemed surfeited with the marvelous things they had seen, came and reposed on the chairs and settees, that they might restore their wasted energies, and again go out in quest of wondrous sights. Others, again, perhaps suffering from indiscretion in diet, or who had in some way overtasked their powers, were brought in, jaded, unstrung, fainting, from the sweltering rays of the sun, to be laid upon the ample lounges, and receive the benefit of such other kindly offices as the attendants were able to bestow.

During the prevalence of sun-stroke and other diseases superinduced by the intense heat, instances of sudden and violent illness were not infrequent at the Building. In such cases, spirituous liquors being interdicted at the establishment, such other applications and restoratives were kept and administered, as, with rest and the natural recuperative forces, usually brought relief,—if not thorough and permanent, at least such temporary relief as enabled the sufferers to be removed in ambulances or rolling-chairs to the Medical Department for treatment.

But, if the State Building had been a favorite resort during the heated term, it was equally so after the biting frosts and chill winds and rains of autumn had set in. None of the principal Exposition Buildings could be furnished with artificial warmth, and indeed that great desideratum in cold weather was a rarity in most of the other structures upon the grounds. The large stove in the main hall of the Pennsylvania Building not only answered its purpose there, but diffused a glow through the other apartments, which made them comforting and cheering to the thousands of shivering guests who sought shelter from the bleak winds and unwelcome rains which characterized the later days of the Exhibition.

Donation of the Building Recommended.

The conveniences which it extended rendered the State Building a necessity to our people, and they will ever cherish for it pleasant and grateful recollections. They regard it as one of the most valued mementoes of the Centennial, and if to them were submitted the question of its demolition or preservation, we doubt not, they would almost unanimously declare for its permanent retention. Visited and viewed in after years, as it now stands, with its furniture and appointments maintained intact, what memories would be recalled, and what thoughts inspired!

The Act which made the appropriation provides that, " at the expiration of said Centennial Exhibition, the State Board of Managers are hereby instructed to sell said Building and furniture, and return the proceeds to the State Treasurer." The sales which have already taken place on the grounds warrant the belief that the property would bring but a mere fraction of its cost ; and surely the sum to be so realized would be of small moment to the people of the Commonwealth, in comparison with the pleasure and satisfaction they would derive if the structure and its contents were retained. The Managers have repeatedly been asked and advised by prominent citizens, some in public and others in private life, to defer any action looking to a sale of the property until the Legislature shall have had an opportunity to reconsider the question of its final disposition. Regarding the present instruction to sell as being directory rather than obligatory, the Board have, under all the circumstances, yielded to what they conceive to be the real will and interest of the people of the Commonwealth, and will await the pleasure of the Legislature as to future action in the premises. The Building and furniture are adequately insured in reliable companies, and the policies will not expire until the 8th of February next. Would it not, meantime, be a graceful and appropriate act to donate the entire establishment to the City of Philadelphia, or to inaugurate some such measure as would secure its permanency on its present site in Fairmount Park? A gift of it for that purpose, under proper conditions, would appear to be the true method, and we doubt not would prove highly acceptable. England has already donated her St. George's House; the German Empire its Pavilion; the Japanese merchants their Bazaar; the lady proprietors their New England Kitchen; and Ohio her State Building. All these will remain as memorials of the Centennial year. May not Pennsylvania add her State Building to these generous contributions to the many rare and interesting objects now in Fairmount Park? The subject is respectfully but earnestly commended to the early and favorable consideration of the Legislature. Even if a sale should be finally ordered, it is believed the interests of the State will not be prejudiced by the postponement which has already been made.

Early Indifference towards the Exposition.

In their earlier endeavors to induce the making of exhibits, the Managers encountered considerable apathy and lukewarmness among certain classes of people. Many seemed unappreciative of the real value and importance of the great object; they could not realize the propriety of incurring expense, and of devoting months of valuable time to a work that would, in all probability, yield no immediate remuneration. Those who had new inventions to introduce, or who hoped at once to profit through concessions or privileges to dispose of their wares and products, were easily enough persuaded to take part. But there were some manufacturers and producers,—and they were men possessed of pecuniary means, too,—who considered their trade and reputation so well established as to dispense with the necessity of resorting to the agency of the Exposition as a medium of advertisement. Others, again, hesitated to exhibit their goods, lest they should be put to the mortification of seeing them eclipsed by superior displays. Others, still, having processes which they regarded as specialties of their own, were indisposed to make them public, in the belief that advantage might be taken of them to their own detriment. They considered that, if the Exhibition had its lessons and resulting benefits, they could derive more profit therefrom as non-participants than by becoming active contributors to the general fund. Thus it will be seen that the feeling which had to be met and overcome was not simply one of indifference, but was in a certain degree selfish. Yet, through steady, persistent, truthful representation and argument, it *was* overcome; and at a comparatively early period all classes were thoroughly awake to the importance of seconding, in every proper way, the intelligent and patriotic purposes of those who originated the Exposition, and who were laboring for its success with such untiring and self-sacrificing zeal. Our people did not fail to discern, that, although the enterprise had been inaugurated ostensibly under National auspices, it had not received that measure of National support to which it was so justly entitled, and they resolved not to be derelict in sustaining Pennsylvania and her metropolis when, amid the jealousies and discouragements which manifested themselves in rival localities, they had practically taken the entire burden upon themselves. But it was not only a question of State or City pride, or of prospective gain to our people. Leading citizens at once took the broader and more comprehensive ground, that, in conserving and advancing the interests of Pennsylvania, they would also promote the interests of the people of other States, and of the civilized world; and that, whilst receiving instruction themselves, they would likewise become instructors of mankind at large. These and similar views being generally disseminated and adopted, the success of the Exposition was assured beyond peradventure.

Allotment and Preservation of Space.

All the space in the Exhibition Buildings had been allotted a considerable time before the State appropriation became available. The Board had not ceased to urge individual exhibits, whilst entertaining the hope of being able to make a collective display. But when the delay in furnishing the necessary means at last compelled the abandonment of this hope, and it became apparent that the State could only be represented through individual exhibits, it was a matter of great concern that none of these should fail. Under the regulations, articles intended for exhibition were not to be admitted after April 19th, and space not then occupied was to be forfeited one week later. Lest this provision might be overlooked by Pennsylvanians, and their space allotted to others, the Board, early in April, issued a circular to the various journals throughout the State, requesting them to call attention to the short time intervening, and to urge upon exhibitors the necessity of having their goods sent in, or at least on the way, before the period named had elapsed, and to inform them, also, that, if they would notify the Board of the time of shipping their exhibits, assistance would be furnished in their reception and installation. This circular was extensively published, and it brought to the Board a number of applications for additional time. On referring and recommending these to the proper Bureau, the requests being fair and reasonable, they were granted, and space which might otherwise have been lost to Pennsylvanians was thereby preserved.

Assistance rendered to Exhibition.

Every facility which the Board could command was extended to exhibitors in bringing forward and caring for their articles, and in having them duly installed. It is matter of serious regret, however, that the State could not have had an active, reliable person, specially employed on the grounds, to look after the wants and interests of her exhibitors even as early as the period of the organization of the Board. Experience has shown the importance and effectiveness of such an agency. Take, for example, our sister State of Connecticut. She made an early appropriation—her's was the first State Centennial Building completed—and her able and energetic agent was on the grounds quite a year before opening day. When it is remembered that the Commission issued its regulations respecting exhibits and applications for space as early as July 4, 1874, the wisdom of this timely action on the part of Connecticut is obvious. Her representative had thus an opportunity to procure and keep a perfect list of all her exhibitors; to bring himself into close communication with them; and to advise and advocate their interests at the very time when such aid and attention were most needed. Connecticut was thus enabled, greatly to her credit, and to the convenience not only of her own people, but to visitors generally, to publish at an early period of the Exposition, a complete catalogue of her exhibitors and exhibits.

Catalogue of Pennsylvania Exhibits.

Sensible of the advantages to be derived from a similar catalogue for Pennsylvania, the Secretary, as soon as the appropriation had been made, was instructed to have one prepared. But it was found on application to the Bureau of Installation, that the work would be for a time impracticable. The entries of applications for space were indiscriminate as to residence, being grouped, not with reference to the States whence the applications came, but under the classifications to which their exhibits belonged. Although the Bureau expressed a willingness to extend every possible facility, yet it was felt, that, to undertake to search through the ponderous folios, and separate the Pennsylvania names and exhibits from the others, at a time when the books were most needed by the officials themselves, would be attended with unceasing interruption and embarrassment, and prove altogether an unwarrantable encroachment. Besides, in view of the near approach of the opening day, it was believed that the time which the attempt would have consumed could be better employed by the Secretary in other and more pressing duties. Under the circumstances, the project of a special list for Pennsylvania was postponed until the official catalogue of the entire Fxposition, then in course of preparation, should make its appearance.

On the 20th June, the Board addressed a printed circular to the Pennsylvania exhibitors named in the official catalogue, requesting them to state, in reply, whether they had been correctly reported therein, and if not, to give such specified information as would conduce to a full and accurate list for preservation in the archives of the State. This circular was distributed by handing copies to the exhibitors when they could be found, or by leaving it at their places of exhibit or addressing it to them through the mails. Many exhibitors returned satisfactory replies, but a large number failed to make any response whatever. After the official catalogue had been revised, the Board, therefore, on the 12th October, caused another circular to be distributed, calling attention to the first, and to the revision, and again requested exhibitors to state whether they had been correctly reported. The importance to the public and to posterity of procuring and preserving a faithful record of the part Pennsylvanians had taken in the great Exposition was strongly urged, and exhibitors were reminded, that, if inaccuracies resulted through their own default, they would themselves have no cause to complain. This resulted in numberless personal interviews with exhibitors, and elicited so many written replies, pamphlets and other printed matter, that, in the midst of the current business incident to the close of the Exhibition, and since, it has been impossible to do more than file the papers away until opportunity be afforded for their thorough examination. Attention will now be devoted to this subject, and as soon as it can be completed, a record of Pennsylvania exhibitors and exhibits will be presented which, in the opinion of the Board, will be of great and permanent value. No one who has not had experience in the preparation of similar compilations, can have a just conception of the labor and care involved in the task.

Pennsylvania Day.—Preliminary Action.

At a special joint meeting of the Board and associate Committees, held at the State Building, on the 30th August, 1876, after the transaction of the ordinary business, the chair stated, that, inasmuch as the Centennial Commission had suggested that the history, resources and capabilities of the several States might be fitly set forth through meetings and addresses on the Exposition Grounds, and that, as New Jersey had already taken the initiative in such demonstration and other States were following the example, it seemed eminently proper that the joint meeting should fix a day for a special assemblage of the people of Pennsylvania, and name a Pennsylvanian thoroughly conversant with her interests to deliver an appropriate address upon the occasion.

Governor Hartranft, who was present as one of the Advisory Committee, said that he had already responded to the request of the Centennial Commission, by setting apart Thursday, the 28th day of September,—the One Hundredth Anniversary of the Signing of the First Constitution of Pennsylvania,—as a proper time for such an assemblage, and that he had selected, as the orator of the day, the Honorable Benjamin Harris Brewster, of Philadelphia.

Committee of Arrangements.

This action of the Executive was at once concurred in, and, on motion of Mr. Rawle, the chair was empowered to appoint five members of the joint meeting, who, in conjunction with the Governor and the President of the Board, should form a Committee to make the necessary arrangements. This Committee was constituted as follows, viz.: Messrs. Rawle (Chairman), Morrell, Mitchell, Nagle, Graham, Hartranft and McMichael. In the selection of the five gentleman appointed by the chair, due regard was had to their proper geographical distribution throughout the State.

Action of the Committee.

The Committee immediately conferred with the Centennial Commission and Board of Finance, and received from them the assurance of their hearty co-operation. It was promised that every feature and appointment of the Exposition should be made as complete and attractive as possible for the occasion. Mrs. E. D. Gillespie, and the ladies associated with her on the Women's Executive Committee, were also consulted, and cheerfully and effectively gave the movement their encouragement and support. Interviews were then had with the leading Railroad officials whose lines enter Philadelphia, and not only were favorable rates of transportation secured, but ample time was given parties from a distance to make the trip, and to view the innumerable objects of interest in the Centennial City, as well as the indescribable wonders within the Exposition enclosure. These preliminaries arranged, a circular was addressed, on the 1st September, to the various editors throughout the State, requesting their aid and influence. They at once enlisted in the cause, and not only gave the circular general publicity, but invited special attention to it through favorable editorials.

The Governor's Proclamation.

On the 12th September, the Chief Magistrate issued a proclamation, wherein, after making suitable reference to the eventful period which was to be celebrated, he requested that Pennsylvania Day might be observed as a State holiday, and that the municipal and County authorities should take action for its public observance, by inviting the people to assemble at Philadelphia to take part in the ceremonies. A cordial invitation was extended by the Governor to all citizens of Pennsylvania, and their descendants residing in other sections of the United States, and to the citizens of other States then visiting or residing in the State, to be present and assist in making the day a memorable one in the annals of the Commonwealth.

Mayor Stokley's Proclamation.

This judicious action of the Executive was appropriately supplemented, on the 15th September, by a proclamation issued by his Honor, William S. Stokley, Mayor of Philadelphia, requesting the closing of all places of business and schools in the City, in order that every opportunity might be afforded the citizens to be present and take part in the ceremonies of Pennsylvania Day. Similar action was also taken by the Mayors of other municipalities, and by the authorities of Counties, boroughs and towns within the Commonwealth.

Special Invitations.

In addition to the general invitation extended by the Chief Magistrate and other authorities to the public, a special invitation was given by the Committee of Arrangements, through a circular, issued September 19th, to the members of the Press, and to the distinguished personages embraced in the following classification:

The ex-Governors of Pennsylvania.

The members and ex-members of the United States Senate and House of Representatives from Pennsylvania.

The Lieutenant-Governor and members and ex-members of the Senate and House of Representatives of Pennsylvania.

The Heads of Departments, the Governor's Staff, and the various Public Boards, Trusts and Commissions of Pennsylvania.

The Judges and ex-Judges of the Supreme Court and Courts of Common Pleas of Pennsylvania.

The Mayors and ex-Mayors and Corporate Authorities of the several Cities of Pennsylvania.

The surviving members of the Pennsylvania Constitutional Convention of 1838; and the Association (whereof ex-Governor Bigler is President), composed of the members of the Pennsylvania Constitutional Convention of 1873.

The ladies and gentlemen composing the Centennial organizations of the several Cities and Counties of Pennsylvania.

Special cards of invitation were also sent by the Committee of Arrangements to the United States Centennial Commission, the Centennial Board of Finance, the Women's Executive Committee, the various Governors and State Boards, the Commissioners of Foreign Governments at the Exposition, the Fairmount Park Commission, and other corporate bodies and associations, and to a limited class of citizens whose eminence in public or private life seemed to entitle them to such distinction.

THE DAY'S PROGRAMME.

The programme embraced the holding of public receptions by the Governor, the Mayor of Philadelphia, and by the Women's Centennial Executive Committee; the giving of concerts, both vocal and instrumental, by the various musical organizations which had kindly volunteered their services for the occasion; and, under the auspices of the Centennial Board of Finance, balloon ascensions at frequent intervals throughout the day, a brilliant illumination of the gardens, fountains and grounds in the evening, and a display of fireworks, which, it was promised, would exceed in extent, diversity and magnificence, anything of the kind ever before attempted on this side of the Atlantic.

APPEALS TO THE PEOPLE.

To advertise the occasion thoroughly, the Committee of Arrangements employed every proper agency in its power. In this connection must be acknowledged the valuable assistance given, not only by the newspaper press, but by the Centennial authorities and the various Railroad Companies engaged in transporting passengers to and from the Exposition. That legitimate State pride was invoked, and that the efforts and determination of the Committee to make the 28th of September the Great Day of the Centennial were in some degree stimulated and fixed by the rivalry of other States, are facts readily conceded. August 24th had been New Jersey's Day; Connecticut had selected September 7th, and Massachusetts September 14th. As each occasion passed the attendance of visitors had largely increased. New York had appointed September 21st for her demonstration,—precisely one week in advance of Pennsylvania Day,—and some of the more sanguine citizens of that State did not hesitate to assert in an ostentatious manner both its ability and purpose to eclipse the Keystone in the multitudes to be assembled. Nor did this, under the circumstances, seem an idle boast. The Centennial Exposition was a place calculated to excite as well as to gratify curiosity. The Chief Magistrate of the Nation, the Emperor of Brazil, the General of the Army, a candidate for President,—any man of distinction, indeed, who was announced upon the grounds, became at once an object of attraction, and was as legitimately subjected to the scrutinous gaze of the sight-seer as though he had been ticketed and numbered, and placed upon the competitive lists as a regular exhibit. It was known that, on New York Day, the distinguished Governor of that State would hold a public reception on the grounds, and it was fairly presumed, that, as one of the aspirants to the highest office in the gift of the people, his presence would not only induce the attendance of large numbers of personal and political friends, but of many others, who, though not his partisans, would yet have a desire to look upon the man. Moreover, on the day preceding New York's demonstration, was to take place one of the grandest pageants ever witnessed in Philadelphia—the Odd Fellows' Parade. This, inclusive of the families and friends of the Order, it was estimated (and with good reason, too, as the sequel disclosed), would bring to the Centennial City at least fifty thousand people, most, if not all of whom would be present at the New York ceremonies, but none of whom would probably remain until Pennsylvania Day.

In view of these facts, it behooved the Pennsylvania management to bestir themselves. Their efforts to make the Keystone State outrival her imperial sister were not the offspring of local jealousy, but were generous and undisguised—inspired by the consciousness that, as Pennsylvania had led all the States in other contributions to the Exposition, she ought, now that it was being held on her own soil, to lead them largely in the number of persons who should visit it on any one occasion. Nor were the management influenced by these considerations alone: they desired to secure such an outpouring of the people on Pennsylvania Day as would be worthy of the historic event to be commemorated, and as would, in numbers, surpass the attendance on any one day at any International Exhibition ever before held in the world. To this end every proper precaution was taken and every legitimate energy employed. The grand result of the Committee's labors was in every respect equal to, and in point of the number in attendance even surpassed, the most sanguine expectations.

Description of Pennsylvania Day.

The morning of the 28th of September, 1876, broke brightly, beautifully, auspiciously. Even at early dawn, the streets of the great Centennial City swarmed with human beings. The bands discoursed sweet music, patriotic fervor manifested itself, and the din and uproar of the swelling multitudes admonished the sleeper that he should rouse himself and prepare to join in the ceremonies and festivities of the day.

What, if the weather had been rainy and disagreeable, unpropitious or unkind? We may imagine the disappointments and vexations which must have ensued. But even the elements themselves seemed to have conspired with the management in rendering the occasion all that could fairly have been wished or hoped. Every reasonable anticipation indeed had been more than realized. It was a glorious autumn morn—a day to recall heroic deeds and sufferings in the past, and to inspire brilliant hopes and honest endeavors for the future—and men, women and children, arrayed in their holiday attire, came forth to do honor to it, and to join each other in gratulation and jubilee. When the sun shone forth through the balmy, bracing atmosphere, and gave additional splendor to the georgeously decorated City, the sea of happy faces congregated on the streets seemed the brighter for his coming. Never was scene more gay and cheery.

Getting to the Centennial Grounds.

The exodus from the City to the Centennial Grounds began early. The various lines of the Pennsylvania and the Philadelphia and Reading Railroads; the numerous Street Railways; countless omnibuses, cabs, hacks and other conveyances, were employed in the transportation of the great living mass. With the exception of the few conveyances which observed the restrictions imposed by their license, every species of rolling-stock on the various routes was, of course, packed to its utmost extent. From the gilded palace-car and magnificent private turn-out down to the unpretentious chaise and dearborn, every means of transit on wheels was invoked; and whilst the wondrous stream of humanity was pouring into the enclosure from the City, trains were arriving every few minutes at the Centennial depots, bringing thousands and thousands of people from other points.

Police Arrangements.

The entrance gates were opened early, and the rush into the grounds immediately began. It was soon apparent that the attendance would far surpass in numbers that of any previous day. To ensure good order, the entire Centennial Police force was on duty, with all the regular detectives and a large number of specials. Ample details were made for the Pennsylvania Building and Judges' Hall, where the ceremonies of the day were to take place.

Scene from the Pennsylvania Building.

Viewed from the balconies of the Pennsylvania Building, the scene on the grounds baffled all attempt at description. The beautiful lake, with its numerous small craft, was spread out like a huge plate of polished silver, set with jewels of every hue; the myriad-jetted fountain flashed and sparkled, and ever and anon its circling mists revealed the gorgeous tints of the bow of promise; and the towering buildings, profusely and brilliantly decorated, seemed grander and more imposing than ever before.

On every hand glared the rich banners, badges and other insignia of Orders and Associations; the dashing plumes and gilded equipages of the citizen-soldiery; and the bright sheen of bayonets and of military bands. These, with the gaily-dressed multitude,—with Turks and Chinamen and other foreign folk in odd and picturesque costume,—all moving to and fro in the glorious sunlight of that lovely morning,—formed a spectacle such as had never before been witnessed, and as we may never look upon again.

ATTRACTIONS AT THE PENNSYLVANIA BUILDING.

The Pennsylvania Building was, of course, the main point of attraction. It was appropriately decorated. The porch and porticoes were festooned all round with the national colors, and at the loops were displayed shields bearing the coats-of-arms of the various States. From the towers and ornamental uprights above the porticoes, and from the dormer-windows and crest of the roof, the flags of all nations, with numerous oriflammes and burgees, fluttered gaily. The Governor's Room was similarly festooned, and was, besides, hung with suitable emblems and devices; and at the southern end, as a centre-piece in a sort of canopy, was placed a magnificent silk banner containing the Governor's portrait, above which were the golden letters "WELCOME." The main hall exhibited excellent taste on the part of the decorator, embracing flags, banners, coats-of-arms, etc., handsomely disposed, with a most elaborate display of silk and bunting at the western end, expressly arranged with reference to the Governor's stand during the reception.

THE GOVERNOR ESCORTED TO THE BUILDING.

At 9½ A. M., in accordance with the programme, Governor Hartranft left the Globe Hotel, near the Centennial Grounds, and proceeded to the Pennsylvania Building, escorted by the Veteran Corps of the First Regiment of Infantry of the National Guard of Pennsylvania. The Veteran Corps was preceded by the Band of the First Brigade, and a number of prominent gentlemen joined in the procession On arriving at the State Building,—the Governor having been joined by his military staff,—the distinguished party was received by the President and Director General of the Exposition and the President of the Centennial Board of Finance, who were, by appointment, in waiting, and under whose escort, at 10 A. M., the procession re-formed and moved to Judges' Hall, where the principal ceremonies were to take place.

CEREMONIES AT JUDGES' HALL.

Judges' Hall was tastefully decorated inside with the flags of all nations, and the colors of the Keystone State were conspicuously displayed above the principal entrance. The spacious platform at the northern end of the hall was beautifully canopied with the national colors, and was richly adorned with rare flowers. Every available foot of room, including the capacious galleries, was soon occupied. On the platform, with the orator of the day, were Governor Hartranft and staff; ex-Governors Bigler and Pollock; Hon. Simon Cameron, United States Senator from Pennsylvania; ex-United States Senator John Scott; Hon. William Strong, Justice of the United States Supreme Court; Hon. Joseph R. Hawley, President, and Hon. A. T. Goshorn, Director General, of the Centennial Commission; Hon. Daniel J. Morrell, Chairman of the Centennial Executive Committee; Mr. John Welsh, President, and Messrs. Thomas Cochran, John O. James, John Price Wetherill, Clement M. Biddle, Amos R. Little and N. Parker Shortridge, of the Centennial Board of Finance; Hon. M. S. Quay, Secretary of the Commonwealth; Hon. Henry Rawle, State Treasurer and Chairman of the Committee of Arrangements; Messrs. Packer, Mitchell, Shoenberger, McCrea and McMichael, of the Pennsylvania State Board; Messrs. Jones, Huhn, Yerkes, Jamison and Nagle, of the Legislative Committees; Gen. Robert Patterson, Mr. S. E. Hartranft and others.

Mr. McMichael, President of the Board of Managers, called the assemblage to order, and began the proceedings by introducing, as the presiding officer of the day, his Excellency, John F. Hartranft, Governor of Pennsylvania, who was received with loud cheers. After several patriotic airs had been rendered by the First Brigade Band, the following original ode was sung by the Corinthian Quartette of the American Vocal Union:

PENNSYLVANIA DAY.

CENTENNIAL.

September 28th, 1876.

THE PRAYER OF HER LOYAL SONS.

Great God! our Father, hear!
Lend now Thy gracious ear;
To Thee we pray:
Give of Thy bounteous grace;
Bless of mankind each race;
Let all Thy goodness trace,
In life's dark way.

Great God! our Father, hear!
Teach us Thy name to fear,
In holy dread:
Make wars and strife to cease;
Oh give perpetual peace;
So earth shall yield increase
Of "daily bread."

Great God! our Father, hear!
Guide all, both far and near,
In our dear land,
In Union strength to find;
One, both in heart and mind;
Oh God! Thy people bind
In love's strong band.

Great God! our Father, hear!
While for our country dear
We wait and pray:
Guard from invading foe;
Keep from intestine woe;
Some good for "token" show;
Thy love display.

Great God! our Father, hear!
As suppliants we appear
Before Thy Throne:
Let not the foot of pride
Come near us to abide;
Be Thou our earthly guide,
And lead us home.

Great God! our Father, hear!
Make Thou our pathway clear
With heavenly light:
Bless Thou our beauteous land,
While we as brothers stand,
In phalanx firm and grand,
To guard the right.

Governor Hartranft's Address.

The music of the band and the singing by the quartette were both well received by the audience. At the conclusion of the ode, Governor Hartranft said:

My Fellow-Citizens: One hundred years ago this day the Colony of Pennsylvania, through its representatives in convention assembled, formally transferred its allegiance from the King of Great Britain to the American Congress, and adopted the first Constitution of the State. Among the names of the members of the convention will be found many intimately associated with the prosperity and honor of the Commonwealth in subsequent years, while its deliberations were presided over by that immortal genius whose contributions to science and philosophy have only been limited by the confines of the world—Benjamin Franklin. What mighty changes have been wrought in our habits and condition as a people since that day, when our fathers dissolved all ties with the Mother Country, and we became a part of this great nation, a nation that has shown what are the possibilities of man under a republican form of government founded on reason and humanity, and consecrated to the fullest liberty! We have only to take the proportions of this immense Exhibition to see how widely, broadly and deeply we have builded Here in these buildings are the manifold evidences of our material, moral and mental development, and we can, without the appearance of vanity challenge the world to show in all its history when a nation has crowded into a century's growth so much that was beautiful and useful to humanity as has America in the hundred years of achievement which this Exhibition is to commemorate.

In this century Pennsylvania has enacted a great part, and it is fitting, therefore, that her people should gather here on this hundredth anniversary of the adoption of her first Constitution to look upon their handiwork, to witness the proofs of their development and progress, and to pledge anew their fidelity to the great State their fathers founded.

Your share, Pennsylvanians, in this great Centennial enterprise, which is here universally proclaimed to be the grandest Exhibition the world has ever seen, cannot but be flattering to your self-esteem, and in congratulating yourselves upon the part you had therein, I know there will be no thought that will give you more satisfaction and pleasure than the reflection that it was largely due to your energy and vast contributions that the Centennial was given an international character, thereby not only attracting to our shores people from other climes, but uniting more indissolubly the bonds that bind together the sections of our common country. Great praise is due, both to the United States Centennial Commission and the Centennial Board of Finance, for their perseverance under the most unfavorable circumstances, and making success out of failure. I, therefore, take great pleasure in extending them the thanks of 4,000,000 Pennsylvanians for their patriotic work.

General Hawley's Address.

When the applause which followed the Governor's speech had subsided, he introduced the Hon. Joseph R. Hawley, President of the United States Centennial Commission, who said:

Ladies and Gentlemen: In looking upon the grand scene before us to-day, within this building and without, somewhat for the time being in the attitude of a mere spectator, my mind naturally reverts to the early days when this enterprise was, so to speak, in darkness. But I refer to this, not for the purpose of rehearsing those early troubles, but merely to suggest a contrast to the beauty and magnificence of the surroundings of to-day. It is our theory that what is to be done by a free people can best be done by the whole people; and upon that we base our government. We hold that all the men of a nation know more and can do more than any portion of their number. Imagine to yourselves what we might have done by way of an Exhibition and a celebration if the whole forty-seven States and Territories had put themselves into this work as grand old Pennsylvania has put herself into it.

Now we are very glad to have done well, for we have tried to do well, but when any man thanks us for what has been done, I feel like saying, let the American people thank Pennsylvania. Had the burden of a great war, a sudden invasion, or any extraordinary calamity fallen upon any one section of the Union, however distant or remote, our fellow-citizens, we know well, would have upborne the honor of the flag. Our people did make a mistake in supposing that this great national undertaking and its responsibilities belonged to any single City or State. It was the work of a nation, and late though the hour, the nation is now awaking to a realization of the fact. The time will come when those who did not foresee in the Centennial its true beauty and real grandeur will thank Pennsylvania, will thank Philadelphia, for having seen it in time and having redeemed the honor of the flag. It is not vanity, it is not a mere hasty feeling of pride, that induces us to say now, after our friends from all the world have said it to us, that this is indeed a great Exhibition, that it is obviously the largest, in many respects the best, and, taking it altogether, the most interesting Exhibition the world has yet seen.

The occasion is peculiar. I trust that the benefits to result from it, as a means of extending knowledge and friendship among our own people, and in cementing the bonds of friendship among all the nations of the world, will be commensurate with its greatness, and will surpass the hopes of its most early and most ardent supporters. I believe that they will; I believe that it has been good for the world that this Exhibition has been held; that it will strengthen the foundations of republican institutions, and that it will teach us to know each other and our government, and our true duties under it.

Mr. John Welsh's Address.

Gen. Hawley's remarks were happy throughout, and at their close, Mr. John Welsh, President of the Centennial Board of Finance, was introduced. Mr. Welsh was rapturously received, and spoke as follows:

Ladies and Gentlemen: I am here as a representative of that great army of workers who have directly aided in the wonderful creation by which we are surrounded. Pennsylvania, and especially Philadelphia, have done more than others because of the traditions connected with their history, but truly this is the spontaneous offering of our whole people and of the nations doing honor to America in this, the Centennial year of her nationality. Heartily do I offer my share of the thanks due to them all, and particularly to the sister nations which have acted with such great courtesy towards us. None who know the American heart can be ignorant of the gratitude that swells our bosoms to-day, not only towards those who have assisted us in the preparations for this grand celebration, but also for the multiplied blessings which have been showered on this nation during the first century of its existence.

"The International Exhibition," this great illustration of the results of American freedom, is the expression of the sentiment which has a home in every heart, and has here had form given to it, so that the ideal has become a reality. The progress of one hundred years is here displayed, and the glory which it reveals is but the fruit of those principles which were given to us as a legacy by our forefathers. Let us, then, be faithful in the practice of those principles, for in that way we shall do most honor to the memory of the men who, by their sacrifices, secured for us the civil and religious liberty we now enjoy.

Mr. Brewster's Oration.

Mr. Welsh was frequently interrupted with applause. At the close of his remarks, the Governor introduced the orator of the day, Honorable Benjamin Harris Brewster, who, after a warm greeting from the audience, delivered the following address:

Fellow-Citizens: On the 24th of August of this year, I received a communication from his Excellency the Governor of this Commonwealth, requesting that I would prepare and deliver, on behalf of the people of Pennsylvania, such an address as in my judgment would most properly represent the history and growth of the Commonwealth for the past one hundred years. His Excellency selected this day, thinking none so appropriate as the Centennial anniversary of the adoption of the first Constitution of the State of Pennsylvania. Since I received that communication, conferring this distinguished duty upon me, I have been seriously ill, and have till within a few days even doubted whether I would have sufficient strength to perform the task that was set before me. But the occasion is a commanding one, and it becomes me to do my best, rather than to flinch away from so noble an obligation. Let this statement explain to you why it is I am obliged to be brief. Indeed, the occasion itself will require brevity. The large assemblage that is gathered here must not be detained by a prolix address from viewing these wonders of art and mechanic skill, which we have gathered in from all parts of the world, as the only fit emblems of those glories of which we have to boast, and of that elevated civilization of which we are leaders. "The Victories of Peace" were first proclaimed and practiced here in Pennsylvania, when this colony was founded, establishing peace as its corner-stone and pronouncing industry and frugality as the greatest virtues of a free Commonwealth. I shall not undertake here, even in an abridged way, to recite to you tabular statements of the increase from time to time of our wealth, our resources, our capabilities in agriculture, manufactures, or arts. So great and so steady has been the advancement of the people of this State in the development and acquisition of its material resources that volumes have been written containing fatiguing tables, which are wise to record and useful to be read and remembered, but they are suited better for the eye of the student and thinker than for the ear of the hearer or mouth of the speaker. I shall not fatigue you by even an abbreviated recital of the events that occurred or the condition of the people of this Province prior to the hundred years from this date. About one hundred and ten years ago Benjamin Franklin, who still is the greatest man that this country ever produced, and who is a philosopher and thinker to be ranked with Archimedes, Pythagoras, Socrates, Plato and Aristotle, in his examination before the committee of the House of Commons, declared that the white inhabitants of Pennsylvania at that day numbered but 160,000, and that the white inhabitants of North America from 16 to 60 years of age were but about 300,000. Contrast that with our present condition. The city of Philadelphia, where you now are, contains 817,443 citizens, and it lies and they live in an area of 129⅛ square miles. It has 1000 miles of streets and roads opened, and over 500 miles of these are paved. It is lighted by nearly 10,000 gas lamps. It has 134 miles of sewers, over 600 miles of gas mains, and 546 miles of water pipes; over 212 miles of city railways, and over 1800 passenger cars passing over them daily; 325 steam boilers, more than 400 public schools with suitable buildings, and over 1600 school teachers and 80,000 pupils; 30,000 bath rooms, supplied with hot and cold water, and for the use of that water the citizens pay more than $1,000,000 annually; 400 places of public worship with accommodations for 300,000 persons; 9000 manufactories having a capital of near $200,000,000, employing 145,000 hands, the product of whose labor is near $400,000,000. In 1873 we exported over $34,000,000, and imported over $26,000,000. The amount paid for duties is near $8,500,000. The real estate assessed for taxation is $518,000,000, and we collect nearly $9,000,000 for taxes. The very Park in which this grand Exhibition is now made contains 2991 acres, and is one of the largest in the world, and is enjoyed every year by millions of people; and we have 130,000 neat and comfortable residences and homes. Compare this condition of our great City now with its condition in 1776 and 1777. In October, 1777, General Howe, then being in possession of the City of Philadelphia, had an accurate census taken, and it was ascertained that in the City and Liberties there were but 5470 houses, and of these 587 were untenanted, and there were but 21,776 inhabitants, exclusive of the army and strangers, and about the same time the number of churches was but 16. The population of the State itself, from being but 160,000, is now near 4,000,000. From the day that Pennsylvania renounced her allegiance to the crown of Great Britain, and dissolved and overthrew the Proprietary Government, has her march been steady and uninterrupted in the course of political, social, commercial and mechanical prosperity. In population she exceeds the Netherlands, Switzerland, Denmark, Scotland, Portugal, Greece, Chili, Morocco, Columbia, the Argentine Confederation, Peru, Venezuela, Bolivia and Paraguay, and in dignity of character as a people she knows no superior. Since 1776 great cities that were unknown have grown up within her borders, and thousands now dwell where at that time was a wilderness frequented by wild animals. Allegheny City, Harrisburg, Lancaster, Norristown, Pittsburg, Reading, Scranton, Wilkesbarre, Williamsport, York and Erie, were then, some of them, mere straggling settlements, and most of them did not exist. Within the borders of Pennsylvania there are elements of wealth, and material for productive industry in quantities, and of a character that are not to be found elsewhere in any part of the United States, and, I think I may safely say, in any part of the world. I speak of her coal fields, anthracite and bituminous, and of her ever-flowing fountains of petroleum; and there are also her agricultural resources, her forests, her quarries of marble and limestone, and mines of iron. How much better it is for us as a people that we possess these elements of wealth, that stimulate all our energies, skill and honest industry to produce and use, than to have mountains of gold or caves of precious gems. Such wealth as that would debauch and demoralize. It would make the rich creatures of silken luxury and the poor the abject slaves of their vicious masters. The productive industry of this State down to 1870 in agriculture was $183,946,027; in mining, $76,208,390; in manufactures, $711,894,344; and in fisheries, $38,114. In that year there were 11,516,965 acres of productive land, and of woodland, 5,740,864 acres, making in all 17,994,200 acres of land. The cash value of the farms was $1,043,481,582; of implements of husbandry, $35,658,096; her live stock was valued at $115,647,075; the whole value of her farm production was $183,946,027. The coal trade of Pennsylvania commenced in 1820, with a total production and sale of 365 tons. In 1873 the State produced 22,828,118 tons of anthracite and

6,085,222 tons of bituminous coal. About the year 1858 the Penn Rock Oil Company was organized on a farm near Titusville. It produced about eight barrels a day. From that time down to 1870 there have been produced 32,512,226 barrels of this oil, of which 15,751,246 barrels were exported to all parts of the world. Now compare this condition of our State with its resources one hundred years ago, when Dr. Franklin said there were but about 160,000 white inhabitants; and, according to the highest statement given, when it assumed sovereign powers, its whole population was not over 300,000. By the original frame of government and the great law enacted in the first year of the Province under the authority of William Penn, it was provided that schools should be established for the education of the young, and the motto selected for those schools by William Penn himself was:

"Good instruction is better than riches."

From that time down to 1749, under this policy, a few public schools of considerable merit were opened by the Quakers and by the Moravians, in Philadelphia and Bucks County. The germ of the University of Pennsylvania began in the form of an academy, and from it there arose three departments—the academic, collegiate, and the medical. The fame of that medical school is one of the glories of the whole nation. In it such men as Shippen, Rush, Wistar, Physick and Hare taught; and since then the great Jefferson Medical College has arisen, and several others of considerable repute. The Constitution of 1776, created in the very darkest hours of our Revolution, provided that "A school or schools shall be established in each County by the Legislature for the convenient instruction of youth. Such salaries to the masters shall be paid by the public as will enable them to instruct the youth at low prices, and all useful learning shall be duly encouraged and promoted in one or more universities." And the Constitution of 1790 provided that "The Legislature, as soon as conveniently may be, shall provide by law for the establishment of schools throughout the State, in such manner that the poor may be taught gratis, and that the arts and sciences shall be promoted in one or more seminaries of learning." Under these provisions laws were from time to time passed, the object of which was to give a practical effect to that purpose. For a long time the schools were shunned by the rich and those who affected the ways of the rich, and were called pauper schools. In 1827 a society was formed in Philadelphia for the promotion of education in this State, and by its efforts a law was enacted in 1834 which did away with this odious idea of pauper education. This was the beginning of a new era and of our common school system. Attempts were made in the succeeding Legislature to break down this enactment, but Thaddeus Stevens and Governor Wolf maintained the law and defeated its opponents; and in 1836 the law was revised and improved, and in 1854, by a further improvement, it was made firm, and became a system that could be enforced. I shall not enter into a detailed description of the provisions of these various statutes, but the credit of adopting and enforcing this law is due to Thomas H. Burroughs, the great Superintendent of Public Schools and of the Soldiers' Orphans' Schools of this Commonwealth. Besides these public schools, we have now more than thirty colleges and universities possessed of large libraries, expensive apparatus, and numerous faculties of learned men, who instruct a large and growing body of students. We have one law school; we have ten medical schools; we have over seventeen theological schools scattered in different parts of the Commonwealth.

Not an acre of ground in this State was ever obtained by conquest; every foot of it was purchased and honestly paid for. As far down as 1792 the Commonwealth purchased first from the Indians and then from the United States the small triangle, now part of Erie County, necessary to secure to the State a good harbor on Lake Erie. The number of Counties at the beginning were three—Bucks, Chester, and Philadelphia. There are at this day sixty-six; one hundred years ago there were but ten. The Commonwealth, having purchased its whole territory, having done its share from the beginning in the

Revolution, having with the aid of the General Government quelled three civil wars within its borders, having settled the boundary disputes with adjacent States, began the performance of its duty as a Commonwealth of freemen. It began to develop its resources, to encourage domestic industry, to enact wholesome laws, to maintain the dignity and purity and promote the prosperity of its people. Had it not been for the purchase of Louisiana by Mr. Jefferson, which gave an open avenue from the sea to the then far West, Pennsylvania and New York would both have been filled with emigrants to overflowing. By the judicious purchase of that French colony the stream of emigration passed over Pennsylvania, and carried with it multitudes of her own children on the westward march to the great Pacific. This for a while hindered the growth of the State in population, and diminished the value of its lands. It became then the highway to the West; it is now the highway from the West. Then it transported men over its soil to populate the wilderness that lay beyond; now it is the highway over which the children of those men bring their wealth and their products to the sea. From the first we engaged in a great system of public improvement. The first stone turnpike in the Union was made here; and so was the first canal over one hundred miles in length. The stone turnpike from Lancaster to Philadelphia, 62 miles in length, was commenced in 1792 and finished in 1794, at a cost of $465,000, by a private company; and as late as 1832 two hundred and twenty turnpike companies had been authorized by law, and most of them constructed to the extent of 3000 miles; and in 1843 a continuous line of stone turnpike extended from opposite Trenton on the Delaware to the boundaries of Ohio, 340 miles in length, with numerous bridges, costing more than the celebrated road of Napoleon over the Simplon. From time to time from the year 1791 to the year 1840 did our State perfect and construct by itself and by incorporated companies many canals, the length of which was 1280 miles, and to that date the total length of railroads in this State was 795 miles, 118 of which belonged to this Commonwealth. In 1847 the great Pennsylvania Central Railroad was begun, and in six and one-half years completed, in the building of which some of the most bold and astonishing feats of constructive engineering were accomplished; the Philadelphia and Erie Railroad was begun in 1852, and finished in 1864. In 1857, from motives of public policy, the Commonwealth sold its public works, and they are now possessed and used by private corporations. There are nineteen canals in the State of Pennsylvania, and one hundred and thirty-nine railroads in active operation. I must not forget to mention a peculiar feature of these internal improvements when they were begun in 1791 or thereabouts. The State of Pennsylvania is intersected with several large rivers and their branches. In the winter and summer their broad beds lie dry—the feeble streams of water trickling down the mid channels. In the autumn and the spring-time they become raging floods. The rains of the autumn and the melted mountain snows of the spring make them vast, deep, furious, rushing rivers of water. Over these the State, in constructing her highways, was obliged to build large and expensive bridges, and she did build some of the grandest structures of this kind that were ever seen in the world—some of stone and some of wood—the most remarkable and astonishing of which are the old wooden bridges that span the Susquehanna and its branches, and the Juniata and its tributaries. As if by providential appointment, when the difficulties were the greatest as to the manner in which such bridges could be constructed, and there seemed almost a hopeless task, a common millwright, a man by the name of Burr, designed and executed that task, without which many of these torrents would never have been passed. To this day they remain monuments of his genius, being practical solutions of what was supposed to be an insuperable difficulty. In 1790, in the Schuylkill region, on the Broad Mountain, Nicho Allen, a hunter, camped out for the night under a ledge of rocks and kindled some fire on the fragments of stone. In the night he awoke and found the black rocks aflame. He made his discovery known, and five years later the blacksmiths of Schuylkill County were using this coal in their forges; and, as a remarkable concidence, Philip Ginter, a poor hunter, in 1791, on the Bear Mountain, nine miles west of Mauch Chunk, made a like discovery. I cannot undertake here to trace the history of the development of these coal fields, but I will say that from that hour the destinies of this State were changed, and from an agricultural people we were destined to become a mining and manufacturing Commonwealth that would bring the whole of the United States—east and north, and even south of us—tributary to us. Our coal and our iron, like our men, were to conquer wherever they went. From the time that the British troops abandoned this city, no foe, foreign or domestic, has ever gained a foothold in Pennsylvania—and they never will. Of the public men of this State I shall say but little. Those who were connected with the Revolution have been embalmed in the beautiful rhetoric of accomplished scholars, whose works have been studied and read with delight by all who now hear me. Of those who followed them in their career I must say something; of those who are living, decorum requires that I should say nothing. Their day of judgment is not yet come. When their great account is ended the impartial historian will tell of them and their deeds. I will, however, remind you that we have given to the Government of the United States—citizens of our Commonwealth—officers of distinguished merit. There was Albert Gallatin, the two Dallases, father and son, Samuel D. Ingham and Wm. M. Meredith and Wm. Wilkins, men of remarkable and conspicuous merit both in public and in private life, and Henry Baldwin, James Wilson and Robert C. Grier, Judges of the Supreme Court of the United States; and in our own Commonwealth we have had upon our own bench Tilghman and Gibson and Lewis and King and Woodward; and at our bar we have had Sitgreaves and the Ingersolls, and Ross and Binney and Sergeant—illustrious and honored. Others I would mention who passed through lives of usefulness and distinction, but the time will not permit me to pause and gather up the list of these eminent persons. And I must not forget those great Governors that first presided under the Constitution of 1790—Mifflin, McKean and Snyder—names that will be remembered with veneration and honor as long as the Commonwealth lasts—real representatives of Pennsylvania and her sturdy people. But there is one other whose name I must not forget. In the mid-day of his manhood he stood before the world the most perfect and accomplished representative of real American gentlehood—I mean Nicholas Biddle. He was a man of whom this State has been proud, and whose name and fame she will ever cherish and honor. Gifted by nature with a beautiful and winning presence, he had a mind stored with learning, and a grace and force of expression that was magical. Early in life he became the president of the last Bank of the United States by the appointment of Mr. Monroe. The institution had suffered in the first days of its existence by maladministration, and I have always thought that it never had fully recovered from the injuries it then received. Mr. Langdon Cheves undertook to reorganize and restore it to its credit and strength. He had the presidency for a short time, and by his own request he was relieved by Mr. Biddle. The history of that institution was one of disasters. It went through a fierce political contest that would have destroyed any institution connected with commercial transactions and financial credit. It represented a vicious system as well as a fatal union between commercial finance and public affairs. Sooner or later it must have inevitably broken down. In this conflict Mr. Biddle bore himself bravely, heroically, and with transcendent ability. But his bank was overthrown, and with it he fell, the victim of his system. His enemies hurt him, but his indiscreet friends entangled and disabled him. But with all this, those who will hereafter read and learn the history of this gentleman, the labors that he underwent, the extent of his attainments, the perfect refinement and polish of his nature, and the patriotic purity of his purposes, will learn to honor and account him as one of the first public men that ever adorned the annals of this or any other State. Before I conclude I will advert to a few facts connected with the political history of the Commonwealth, and that relate directly to the occasion we now commemorate. In 1682 William Penn presented the great law for the government of this Province, containing 61 chapters, that had been carefully prepared by him. I never read it but that I am impressed with a sense of veneration for this man's wisdom and forethought. I do not wonder that Mr.

du Ponceau, in his celebrated address before the Philosophical Society ranks him with Solon and Lycurgus. It is marvelous to see the reason, liberality and prudent forecast of this man. At this day there does not exist a paper that excels it in a high philosophical appreciation of the rights and duties of citizenship. But when 1776 came, and the people of these United States and the representatives of the United States of America, in general Congress assembled, declared that they were free and independent States, the people of this Province forthwith abolished the Proprietary Government and established the Commonwealth of Pennsylvania. Take that paper and read it, and read it again, as I have read it, with wonder and admiration; remember that at that time such things were new and unknown; that it was of the first of those great fundamental laws that had established Commonwealths and upheld private and public liberty, and enforced obedience to law and order. Read the preamble of the Declaration of Rights, and you will read it with instruction and admiration and delight. None have ever since been composed that can excel it in all the necessities and requirements of such a document. It has passed away. It was superseded because it gave too much power to the Legislature—power that it was necessary then to give because of the pressing exigencies of the dark days in which it was made. There are provisions in it which it would be well to place in every Constitution. In the thirty-sixth section, in the chapter on the plan or frame of government, you will find this remarkable passage: "And every freeman, to preserve his independence, if without sufficient estate, ought to have some profession, calling, trade or farm, whereof he may honestly subsist. There can be no necessity for or use in establishing offices of profit, the usual effects of which are dependence and servility, unbecoming freemen, in the possessors and expectants; faction, contention, corruption and disorder among the people. But if any man is called into public service to the prejudice of his private affairs, he has a right to a reasonable compensation; and whenever an office, through increase of fees, or otherwise, becomes so profitable as to occasion many to apply for it, the profits ought to be lessened by the Legislature." The 47th section of the same chapter has a remarkable provision for the creation of a Council of Censors, whose duty it was to inquire whether the Constitution had been preserved inviolate in every part, and whether the legislative and executive branches of the Government have performed their duty or assumed to themselves or exercised other or greater powers than they are entitled to by the Constitution; to inquire whether public taxes have been fairly laid and collected in all parts of the Commonwealth; in what manner the public moneys have been disposed of, and whether the laws have been duly executed. They shall have authority to pass public censures, to order impeachments, and to recommend to the Legislature the repealing of laws that have been enacted contrary to the principles of the Constitution. This was the last section of that memorable paper, the section that was abolished in the Convention of 1790, and not restored by that of 1838 or 1873. From our experience one would almost wish that it still existed. And now, one hundred years after that great paper became the fundamental law of this great Commonwealth, we stand here to commemorate its enactment, and to exult—thankfully exult—over the marvelous prosperity of our people. To what do we owe that prosperity? Not to emigration, for men have emigrated from Pennsylvania to strengthen and dignify other Commonwealths. The flood of foreign emigrants swept over our State, not into it. The freemen of Pennsylvania this day are proudly the descendants of their ancestors of 1776. The bulk and body of our population are Pennsylvanians. We owe it to our love of freedom and our obedience to law. We owe it to the natural wealth of our soil, and our mines, and our quarries, and our forests, and our irrepressible, laborious, industrious, honest spirit of enterprise. We owe it to the providence and care of Almighty God. Let us not, then, forget it. Let us adhere to the sacred institutions of our great founder and his great successors. Let us use these bounties frugally, temperately; and let us exclaim, thankfully and devoutly,

"To Thee, O God! we owe all this."

"We acknowledge Thee to be the Lord. All the earth doth worship Thee, the Father everlasting."

Mr. Brewster's delivery was dignified, eloquent and impressive, and at the close of his masterly review of the history, progress and development of the State, he was not only publicly applauded by the large audience, but received many personal congratulations from the distinguished gentlemen on the stand.

Ex-Governor Bigler's Address.

Ex-Governor Bigler was then introduced, and came forward amid great cheering. He said:

Mr. President, Ladies and Gentlemen: The Centennial is an immense subject, yet none other would be proper for me on this occasion, and I can only present it briefly and imperfectly. It abounds in something of history and lessons in progress and civilization. It at once turns our thoughts to the origin, growth, achievements and present status of our own Republic, and awakens in every true heart a desire to do something in honor of the memories of the statesmen, patriots and soldiers, who, through pinching privations, and a free expenditure of blood and treasure, established that Republic on the principle of self-government. With these thoughts passing through my mind, it seems impossible to refrain entirely from an allusion to the Revolutionary struggle. Passing by the Declaration of Independence, our imagination calls up the scenes that followed, in order to give practical effect to that Declaration. The scene at Concord, at Lexington, at Bunker Hill, at Trenton, at Germantown, at Valley Forge, at Brandywine, at Saratoga, at King's Mountain, at Cowpens, and the glorious triumph of the American arms at Yorktown. Then came peace, liberty and practical independence. Then America took her position as a member of the family of nations. The marvellous growth of the Republic in population and States, and its unparalleled progress in all the arts of peace, are matters of familiar history which I need not repeat to you on this occasion, nor need I dwell at length on the means devised for the celebration of these achievements in the first hundred years of the Republic. The story would be too protracted. The ceremonies are still in progress, and you can witness them and scrutinize the national display, composed of manufactures, works of art, and the products of the soil and mine, in comparison with those of other countries.

When you have done this, you will see no reason to be ashamed of the infant Republic. So far from this, when you look upon the international display and hear the comments upon it, upon all its departments and appointments, by competent visitors from other countries, comparing it with the Exhibitions that have preceded it in Europe, you will surely feel elated because of the acknowledged triumph of your own country, and because in a work so peculiarly difficult for a young nation, ours has taken a high position. None of the competent judges of International Exhibitions have been more unqualified in their commendation of our Exhibition than the representatives from Great Britain; and, at the hazard of becoming tedious, I must say that amongst the delightful incidents of the celebration and Exhibition, nothing has struck me as so peculiarly gratifying as has the bearing of the people and government of Great Britain. In a spirit of true magnanimity they have put away all remembrance of our Revolutionary separation from their country, and have united with us in the celebration of the achievements of the Republic in the first hundred years of its existence, with unqualified good-will and zeal, contributing to the display the choicest of the products of their great country. I doubt whether modern history furnishes any other instance of such pure magnanimity, or the evidence of higher civilization; and I am sure you will agree with me, that nothing could be better calculated to bind the two countries together in bonds of mutual confidence and good will. And this will be in confirmation of what some of us maintained from the beginning, that the Centennial would be to the interest of peace amongst the nations, and good will and fraternal affection amongst our own people.

I know you will believe me when I say that nothing incident to the Centennial celebration is so fresh in my mind as the struggle for the proper preparation for the ceremonies—the raising of the funds, the arrangement of the grounds, the erection of the buildings, and the organization of the vast display. It is not immodest to say that this work was an herculean one, and that it has been carried to a high degree of perfection. One of its beauties consists in the completeness of its details. The least important things were well done. A detailed history of this work would not be admissible on this occasion. I may say, however, that success was earned by the courage, energy and persistence of the men to whom the work had been intrusted.

But, as you are aware, it nevertheless underwent severe trials and many disappointments. For many long months its ultimate success was anticipated by some of its friends but vaguely, and with grave doubts as to whether they should ever see it face to face. The preparations were inspired by a true devotion to the country, and conducted on pure business principles, and those who directed it may well be indulged in some exultation over the fact that, although until near the completion the capital arose from the voluntary contributions of the people, no one connected with the work, whether contractor or laborer, was ever required to wait a single day for the money due him—all demands were met in cash when due. Other considerations contribute to stimulate a just pride in the undertaking, and not the least of these is the fact that though the laws providing for the celebration were somewhat difficult of definition, the Managers had the good sense and prudence to settle all points of difference without serious conflict or damaging scandal; and, again, it is due to them to say that whilst many of the leading statesmen of the country resisted the plan of an International Exhibition, insisting that the display should be national only, those intrusted with the management, without exception, maintained that the international feature was indispensable to success. On this point their authority has been most emphatically vindicated. Stripped of the display from foreign countries, what remains could not in a sufficient degree have commanded the admiration of our own people. All things considered, the consummation must be accounted glorious. Our own people are coming together at the birthplace of the nation from every section—the North, the South, the East, and the West—to manifest their attachment to our free institutions, whilst representative men from all other civilized nations, with the choicest of the productions of their respective countries, are here to do honor to the youngest of the nations. In the midst of these ceremonies our infant Republic has passed from the shades of the first century of its existence into the dawn of the second, carrying with it the profound respect and best wishes of every member of the family of Nations. May God protect it in the future as He manifestly has in the past.

Ex-Governor Pollock's Address.

Ex-Governor Bigler's remarks elicted great applause, as did also the brief speech of ex-Governor Pollock, who was next introduced. Ex-Governor Pollock said:

Ladies and Gentlemen: Brevity has been counselled, and I will practice it now. When, in 1681, Charles the Second, by patent, granted what is now Pennsylvania and some portion of Maryland and Delaware to William Penn, in consideration of the annual payment of two "beaver skins," that fast and fanciful monarch and his state councillors never in their wildest dreams or most lively imaginings supposed that the event of this day could by possibility occur.

This is Pennsylvania's Day—a proud old Commonwealth founded in deeds of peace by one whose name and memory we all honor; one who recognized the broad and essential principles of civil and religous liberty; who laid the foundation of everything that is good in American manhood and is illustrated in our Pennsylvania character; who laid the foundation for that high and noble act of 1780, when Pennsylvania, in anticipation of the coming hour of freedom to America, declared that no slave should pollute the soil of our State. In the Declaration to which reference has been made, the grand system of popular education was projected—education in our common schools, free, wide, progressive and noble—education developing in our primary schools, in our grammar schools, in our higher schools, in our colleges, in our universities, scientific, classical and literary—in our medical schools, in our theological schools—a system of education to-day that makes and marks Pennsylvania among the first of the States of this grand Union. It is because we are a State believing in education, believing in colleges, believing that education, like the beautiful sunlight that beams upon us, should generously and harmoniously invigorate and strengthen every thought and every idea that goes to make up American manhood and American nationality. Forever stand wide open our schools, forever flourish our colleges, forever keep wide open the doors of our churches that invite to the worship of the living God. There follows freedom of conscience, liberty to all, education to all, the rights of all recognized, man redeemed from the tyranny of the past, and man restored to the dignity of manhood and bade to go onward and forward in the grand career that God, in His infinite mercy, has set out for him, making him what he is to-day. Onward, then, citizens of this grand Republic. Lift high its banner; bear it aloft in the cause of morality, independence, and everything that constitutes true manhood. Let it be for you to tell to the coming centuries that the impress of this hour is made upon them; and the nations, relieved from oppression, rejoicing in right, shall ever refer to this jubilee of American nationality and intercommunication with the world as the grand fact that made them free.

SENATOR CAMERON'S ADDRESS.

The next speaker was the Honorable Simon Cameron, who was most cordially received, and who addressed the assemblage as follows:

MR. PRESIDENT, LADIES AND GENTLEMEN: This is a great day for Pennsylvania. I am glad to be here to greet you, my fellow-citizens, for we have reason to be proud on such an occasion. And not only as Pennsylvanians, but as Americans also, have we reason to feel that we this day stand foremost among the nations of the earth. In other countries similar Exhibitions have been held, but none on so grand a scale as this. Scores of other peoples, and even the isles of the sea, have contributed towards this great occasion. And what is a source of especial pride to Pennsylvanians and to Americans is that, notwithstanding all the great expenditures of money, not one connected with the management has ever been charged with any maladministration. Philadelphia has been unkindly and unjustly criticised. Many intimated that we could not make the Exhibition a success. But I feel satisfied in my own heart that, had all others held back or withdrawn from this movement, Philadelphia and Pennsylvania alone would have begun and carried to completion this entire Exhibition, and paid all its cost without asking aid from any others. Little did I think that I should live to behold such a sight as here met my gaze this day—a city springing up as if by magic, with nearly a quarter of a million of strangers as visitors. My heart is full of deep emotion, and I pray God that the future of Pennsylvania may be even more glorious than its past, and its free institutions ever remain as monuments of the wisdom and forethought of our fathers.

JUSTICE STRONG'S ADDRESS.

Senator Cameron's remarks were warmly applauded, and at their close, Governor Hartranft said he had the great pleasure of introducing to the audience the Honorable William Strong, formerly of the Supreme

Bench of Pennsylvania, but now one of the Justices of the Supreme Court of the United States. Justice Strong had a cordial greeting from the audience, and spoke as follows:

Ladies and Gentlemen: I have great pleasure in meeting my fellow-citizens here to-day. All my love is for Pennsylvania. What she did one hundred years ago, what she did during the intervening years, and what she is now, cannot be made more familiar to you by words of mine. As to our national progress, when I compare it with that of other nations, I cannot refrain from exultation. To-day Pennsylvania celebrates her own birth, together with that of the nation of which she has always formed a most important constituent. But if nothing had followed the wise work of our forefathers, the Declaration of Independence would be nothing but a document full of grand sentiments; there would be no occasion to-day for universal congratulation. Our first Constitution, whose adoption we celebrate to-day, gave liberty, stimulated the exertions of our ancestors, and led to the results that now surround us. We have made not only wonderful progress in the arts and sciences, but also great improvements in our laws. What family is not now more comfortable than a family of the same rank in 1776? How many more now have their minds stored with useful knowledge than there were of such persons a century ago, in proportion to the population? And where is the man who would exchange our present laws for those that governed us a hundred years ago? Well may we congratulate ourselves, not only on what our fathers did, but also on what has since been done by their sons!

Ex-Senator Scott's Address.

The last speaker was the Honorable John Scott, ex-United States Senator from Pennsylvania. Mr. Scott had not expected to take any prominent part in the ceremonies, but being called upon and introduced, he came forward amid loud and prolonged cheers. He exhibited deep emotion, and spoke most eloquently. He said:

Mr. President: I was not invited to speak upon this occasion,* and I came, with other private citizens, expecting and intending to be a spectator and a listener. The gentlemen who have already addressed you as pre-arranged, have done full justice to the political and industrial history of the State. For this reason I should not follow them, or detain you; and besides, there are some sad reasons of recent occurrence why I should not speak. One of them † has called frequently to my mind, and to my lips, the words so often quoted by Mr. Lincoln: "Oh why should the spirit of mortal be proud?"—and carrying them with me even to this scene, I have thought, that, if ever there was a time when a feeling of pride would be justifiable, this day is that time for Pennsylvanians. Proud we may well be that within our borders this great Exhibition is located; proud that our sister States are here to celebrate the hundredth year of the Republic's life, and to rejoice in the progress they have made in science, in art, in industry, in culture, in all that tends to enlighten and to improve mankind; proud of the presence of so many of the nations of the earth, vieing with us in friendly rivalry for superiority in all the varied industries and employments of civilized life; proud of the character and conduct of the great multitude of Pennsylvania's men and women here to-day assembled; and proud of Philadelphia as our chief city, and of the place which this year and its events will give her in the world's history. I might speak of other just occasions for our pride, but I forbear. It would be unjust to you, and to myself, did I permit even the interest of this day to betray me into a speech at any length. There is, however, one truth of which we may be proud, and of which I may, in conclusion, speak. It is the fact so forcibly portrayed by the orator of the day, that our beloved Commonwealth was founded in peace, that her first lawgiver was a man of peace, of truth and honesty, who, in the interests of peace, made treaties and sacredly kept them.

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* The Committee of Arrangements had, by telegraph, specially requested all the United States Senators and ex-United States Senators from Pennsylvania, with the ex-Governors of the State, to be present and deliver brief addresses; but Mr. Scott was absent from his home in Pittsburgh, and (as appeared by a telegram from his son, Mr. William Scott) had not received the invitation.—*Board of Managers.*

† This remark, it is understood, had reference to a domestic affliction—the distinguished speaker having, but a day or two before, learned of the death of his brother in Savannah of yellow fever.—*Id.*

A few years ago, when driving over the country to one of the country towns in the northern part of the State, I was pointed to a stream, a short distance to the right hand of the road, which flowed eastward to the Susquehanna and the Chesapeake Bay, and to another a little to the left, whose waters, running to the west, found vent through the Allegheny and the Ohio to the Gulf of Mexico. As these waters, thus flowing so widely apart, again unite and mingle in the warm current of the Gulf stream as it goes onward breaking up the icy regions of the north, may we not express the hope, that, from the temporary homes of the many States and Nations which have clustered upon the beautiful slopes of this Park, there may go out through all the world the sweet influences of peace and good will, which will make this our Centennial year a harbinger of that time "when the sword shall be beaten into the ploughshare, and the spear into the pruning-hook, and when nations shall learn war no more."

After the Ceremonies at Judges' Hall.

When the manifestation of approval which followed Mr. Scott's remarks had ceased, Governor Hartranft announced that the ceremonies of the morning had terminated, and the audience accordingly dispersed. During the interim between this and the afternoon exercises, all amused and regaled themselves as best they could. Numerous fantastic balloons were sent up for their entertainment; the chimes in Machinery Hall rang out merry and patriotic airs; and at various points the bands discoursed sweet music. Some of the visitors climbed the towers to gain the best possible view of the motley scene; others sauntered about among the serpentine walks and lovely gardens; the railway passing around the grounds fell far short in the complement of its rolling-stock; and never had day been so busy with the wondrous car which crossed the ravine on a single track. Those who had brought their luncheon, enjoyed it; the others repaired to the restaurants and cafés within the enclosure, or to the numerous hotels and stands immediately outside the grounds. The resources in food were ample, and no one needed to go long without having his wants supplied.

Pennsylvania Building during the Afternoon.

POST 58, G.A.

As in the morning, so in the afternoon, the Pennsylvania Building was the central point of attraction, the Governor and his escort having returned to it as soon as the ceremonies at Judges' Hall had terminated. The distinguished party arrived a little before 1 o'clock, and at once retired to the Governor's Room. The people, supposing that the reception was immediately to begin, now collected in such numbers, both inside and outside the Building, that, in a few minutes, both ingress and egress were completely cut off, and it was with the utmost difficulty that Major E. H. Butler and the guards under his command cleared the way so as to enable the Governor and his staff, and a few other dignitaries, to pass out and proceed to the Lafayette Restaurant, where a repast awaited them. The Governor and his party returned about 2 o'clock, and, as soon as they had gained access to the inside of the Building, which was accomplished with great difficulty, the reception commenced.

The Governor's Reception.

On taking his stand at the west end of the main hall, the Governor was greeted with loud and long continued cheers. Adjutant General James W. Latta stood by his side, and near him were the following named members of the Governor's staff, and other military officers, all in full uniform, viz.: General George F. Smith, General Lewis W. Read, General John D. Bertolette, Colonel John W. Schall, Colonel Charles S. Greene, Colonel D. Stanley Hassinger, Colonel William R. Hartshorne, Colonel J. K. Haffey, Colonel John B. Compton, Colonel George H. North, Colonel G. W. Grant, Colonel R. R. Campion, Colonel P. Lacey Goddard, Colonel William L. Elkins, Colonel W. W. Brown, Colonel A. K. Dunkle, Colonel E. B. Young, Colonel J. F. Tobias, General Frank Reeder and Major E. H. Butler. A passage-way, running lengthwise through the hall, was formed by two lines of guards, along which the guests moved from the front entrance to the Governor's stand, where, after giving and receiving the customary salutations, they passed out through the two side doors leading to the rear porches, and thence to the grounds. The first received were the Soldiers' Orphans of the Northern Home, followed by the Orphans of the Lincoln Institute, the Soldiers' Home and the Educational Institute, all uniformed, and accompanied by brass bands composed of their own members. With these were a hundred girls from the Northern Home, in white dresses and black coats, under the direction of Miss Herschberger. Mrs. E. W. Hutter, a lady whose unceasing interest in the care and advancement of the Soldiers' Orphans deserves special mention, was also present. Mr. Grimm, one of the trustees of the Northern Home, headed the column, and bore in his hands a beautiful basket of rare flowers. This basket was handed to Colonel Howard Adams, commanding the Northern Home Cadets, and in presenting it to the Governor, he said:

Governor Hartranft: The soldiers' orphans of the State present this floral tribute to you, in token of our respect for you as the Centennial Governor of Pennsylvania, and our regard for you as the warm friend of the soldiers' orphans.

To which the Governor replied:

My youthful Soldiers and Friends: It is ever the source of the greatest gratitude to me that the orphans of so many heroes of our late war are, by the charity of the good people of our Commonwealth, not only provided for, but are being prepared in so thorough a manner for the battle of life which looms up before you all; and it is a source of pride to me that there are not in all the other States so many of the soldiers' orphans so well provided for as in our own State of Pennsylvania. I thank you for the tribute you have given me, aud assure you that I will be your friend in the future as I have endeavored to be in the past.

The Governor's speech was warmly applauded, Colonel Adams received a hearty shake of the hand, and the orphans were each cordially greeted as they filed past the Governor, and gave place to the members of the Keystone Battery, who next passed in review. Then followed the Select and Common Councils of Philadelphia, headed by Mayor Stokley, under the escort of President Smith, of the Select, and President Caven, of the Common Council. Next came the Veteran Corps of the First Regiment, and afterwards, all who could force their way into the line of procession. For three hours a constant stream of people flowed through the hall. One observer, who kept note of both time and numbers, estimated that they passed at the rate of 52 a minute; another placed the figures as high as 60 a minute. Accepting the first estimate, the total number passing during the reception would be 9,360; accepting the latter, it would be 10,800. All seemed to agree that fully one-half this array took the Executive by the hand, and preserving his dignity and suavity to the end, he did not fail to receive the congratulations of gentlemen present who appreciated the severity of the ordeal he had undergone, when, at 5 o'clock, the reception ceased.

AFTER THE GOVERNOR'S RECEPTION.

At the close of the public reception, the Governor retired to his room, where he had a brief and informal meeting with the ladies of his staff officers. He then, under escort, proceeded to the Municipal Building to pay his respects to the Mayor, and, although the public reception given by that functionary had closed, the doors were at once thrown open and the Governor and his party warmly welcomed by the Mayor in person. After an exchange of the usual civilities, the Governor and his staff bade adieu to the Mayor and his friends, and by previous engagement, went to join the reunion of the Constitutional Convention Association.

DISTINGUISHED GUESTS.

In addition to the guests already named, there were present during the ceremonies a great number of distinguished persons, embracing the Governors of several States; United States Senators and Members of Congress; Heads of State Departments; Members of the Pennsylvania Legislature; Members of the Constitutional Convention; Members of the Centennial Commission and Board of Finance; Representatives of Foreign Governments at the Exposition, etc.; with many others eminent in public and private life, most of whom registered at the Pennsylvania Building.

MAYOR STOKLEY'S RECEPTION.

His Honor, Mayor Stokley, to whose generous, unflagging and powerful co-operation with the Committee of Arrangements the grand success of Pennsylvania Day was largely due, was amongst the first to pay his respects to the Governor at the latter's reception, and soon thereafter proceeded to the Philadelphia Municipal Building on the Centennial Grounds, to begin his own. He was accompanied by a large number of Select and Common Councilmen and other dignitaries, the procession being headed by McClurg's Band. The Building had been decorated and set in order expressly for the occasion, and every arrangement made for the ceremony to pass off pleasantly. On arriving the Mayor retired to his private room, remaining there until 3 o'clock, when he appeared in the main hall, and the reception began. The first to greet him was Mr. Alexander M. Fox, who was followed by Mr. Joseph L. Caven, President of the Common Council, and Mr. George A. Smith, President of the Select Council, of Philadelphia,—these gentlemen remaining by his side to assist him during the reception. It would be impossible to name even the more prominent personages, who, during the busy two hours the reception lasted, joined the vast throng which, in addition to the Governor and his staff and the officers of the Exposition, went to do honor to Philadelphia's Centennial Chief Magistrate. Let it suffice to say, that the Mayor gave every one a cordial welcome, and the reception was alike gratifying to himself and to his guests.

The Ladies' Reception.

The reception given by Mrs. E. D. Gillespie and the other ladies of the Women's Centennial Executive Committee, began at Judges' Hall precisely at 3 P. M. The decorations remained much the same as in the morning, though the appearance of so many ladies on the platform materially changed—it is, perhaps, due the fair ones to say improved—the scene. Along with the distinguished President, were Mrs. John W. Forney, Mrs. John Sanders, Mrs. Frank M. Etting, and several other ladies of the Committee. As soon as they had taken their places, the reception began. Amongst the first to pay their respects were Gen. Hawley, President of the Commission, and his staff, in uniform. Soon afterwards came Generals Merrill and Green, Judges Allison and Peirce, Mrs. General Hawley, numerous members of the State Legislature and Philadelphia Councils, and many ladies connected with the Women's Centennial Committees in the various States. Mr. John Welsh, Director General Goshorn, Hon. Daniel J. Morrell, and other gentlemen of the Commission and Board of Finance; the President and Board of Pennsylvania Managers, and the Advisory and Legislative Committees; the Governors of various States, and hosts of other eminent personages availed themselves of the opportunity to do honor to the illustrious band of women who, by their ability and untiring zeal, had contributed so largely to the success of the Exposition. The reception closed at 5 P. M., a countless number having passed through the hall, and all being delighted with the beauty of the scene and with the graceful and cordial greeting which they had there received.

Constitutional Convention Association Reunion.

The members of the Constitutional Convention Association of 1873 were amongst the distinguished guests specially invited to participate in the ceremonies of Pennsylvania Day, and made it the occasion of their annual reunion. Quite a number of them met at the Belmont Restaurant, where, after the transaction of the business of the Association, they partook of a sumptuous dinner. The list of toasts and responses was as follows: "The Centennial"—Ex-Governor Bigler; "Pennsylvania Day"—Linn Bartholomew; "The New Constitution"—George W. Biddle; "The City of Philadelphia"—Morton McMichael; "Our Commercial Interests"—Edward C. Knight; "The Next Centennial"—James Boyd. With the exception of a select few, the dinner was limited to the members of the Association. The occasion was one of rare interest, and will long be remembered with pleasure by those present.

Attractions of the Evening.

The entrance gates were kept open until 7½ o'clock for the accommodation of all who desired to witness the display in the evening. The buildings generally were illuminated, and above the main entrance to the Pennsylvania Building the word "PENNSYLVANIA," in large letters, blazed from a myriad of gas jets. During the evening an exhibition of the stereopticon was made on a scale of unusual magnitude, and electric, gas and colored lights were profusely used in illuminating the fountains, buildings, and gardens. A calcium light of extraordinary power was placed on the top of Machinery Hall, and as its intensely bright rays were successively directed to various parts of the enclosure, the effect was wonderful. The pyrotechnic display was, by common consent, pronounced the finest ever witnessed on this continent. It was made by Messrs. C. T. Brock & Co., of London, under the auspices of the Centennial Commission and Board of Finance, and cost five thousand dollars. With one or two trivial exceptions, it was all that could have been desired, a most satisfactory feature being the steadiness with which it was kept up from the beginning to the close. Perhaps no finer pyrotechnic display was ever witnessed than that which opened the programme—the simultaneous illumination of the grounds and buildings.

Object of the Evening's Display.

The evening's entertainment had been arranged, not only as matter of general interest and attraction, but to facilitate the handling of the populace by the various agencies of transportation. If the ceremonies of the day had ceased at the usual hour of closing the gates, the pressure everywhere would have been great, and unpleasant, if not serious, consequences might have ensued. As it was, large numbers, content with the sights and ceremonies of the day, left the grounds early in the evening, whilst many who remained to witness the illumination and fireworks, anticipated the rush which would follow the close of the display, and wisely sought their conveyances in time. The immense crowd was thus gradually diminished, and a leading object of the management happily attained. When the final bouquet of rockets had been discharged, although the rush of the multitude for conveyances home was unprecedented, yet there were no casualties and comparatively no disorder. Every one seemed to observe the proper amenities, and to cultivate and maintain the good order and good humor which had been pre-eminently the characteristics of the day.

TRANSPORTATION FACILITIES.

Speaking for himself and the Centennial Board of Finance, Mr. John Welsh, in a letter to the President of the United States, once expressed the belief that the Exhibition would so far command the approbation of the people of this and other countries, that the attendance of visitors would be "limited only by the means of transportation." This prediction was more fully realized on Pennsylvania Day than on any other, and it may fairly be questioned whether any State or City, save our own, could have provided so successfully the means of transit required for such an emergency. Great credit is due to the various Railroad Companies, and indeed to all engaged in transporting the multitude, for the unexampled facilities which they afforded on the occasion.

ADMISSIONS ON THE SEVERAL STATE DAYS.

The following statement, compiled from the official count, will exhibit the free, cash, and total admissions on the several State days:

STATES.	DATE.	FREE.	CASH.	TOTAL.
New Jersey	Aug. 24,	10,727	56,325	67,052
Connecticut	Sept. 7,	10,985	64,059	75,044
Massachusetts	" 14,	12,073	85,795	97,868
New York	" 21,	12,585	122,003	134,588
PENNSYLVANIA	" 28,	17,750	257,169	274,919
Rhode Island	Oct. 5,	11,886	89,060	100,946
New Hampshire	" 12,	13,881	101,541	115,422
Delaware, Maryland, etc	" 19,	15,052	161,355	176,407
Ohio	" 26,	13,361	122,300	135,661

THE ATTENDANCE ON PENNSYLVANIA DAY UNPRECEDENTED.

For purposes of comparison, a statement, compiled from the same source, is subjoined, showing the free, cash, and total admissions on the three grand ceremonial days of the Exposition:

DATE.	OCCASION.	FREE.	CASH.	TOTAL.
May 10,	Opening Day	110,500*	76,172	186,672
July 4,	Independence Centenary	10,204	46,290	†56,494
Nov. 10,	Closing Day	15,354	106,367	121,721

It may be remarked here, that, next to the score on Pennsylvania Day, came that of Thursday, November 9th, the day preceding that on which the Exhibition closed; the admissions being: Free, 16,154; Cash, 176,924; Total, 193,078. Thus it appears that the attendance on Pennsylvania Day considerably more than doubled that of the highest of the other State days, and scored nearly 82,000 above that of its rival of November 9th. But not only did Pennsylvania Day in this respect exceed all others during the Centennial: it did more. By far the highest number of visitors ever attending any previous International Exposition. on any one day, was at Paris, France, on Sunday, October 27, 1867, when the score reached 173,923. The attendance on Pennsylvania Day outnumbered this by nearly one hundred and one thousand! The excess would in itself have been sufficient to populate a city.

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* This is the estimate of the Department of Admissions. The turnstiles worked so imperfectly that the true number could not be ascertained.

† This cannot be regarded as a test—the principal ceremonies having been held in Independence Square, fully four miles distant from the Centennial grounds.

Numerical comparisons under this head should be restricted to the modern world-fairs, in which character and productions should be the chief distinction. The world may indeed have witnessed larger assemblages than that of Pennsylvania Day, but these were, for the most part, convoked upon military necessity, or to minister to the ambition or caprice of despotic power. Pennsylvanians, therefore, should be all the prouder of their demonstration, since it was for the advancement of civilization, and in the interests of peace and good-will towards all mankind.

Appropriation to the Geological Survey.

On the 25th of April last, the Second Geological Survey of Pennsylvania, through its Secretary, Professor John B. Pearse, applied to the Board of Managers for an appropriation to enable the Survey to exhibit a scientific collection illustrative of the geology and minerals of the State. Professor Pearse stated in his application, that, under a decision of the Attorney General, the Survey had been precluded from employing any part of its own funds for the purpose in view. The subject was considered at a meeting of the Board, on the 29th of April, and the importance of the proposed display was recognized by an appropriation of one thousand dollars to defray the necessary expenses. It was really too late, however, to make such a collective display as could have been desired in time for the opening day; hence, of the amount appropriated, the sum of seven hundred and seventy-seven dollars and thirty-six cents ($777.36) only was required to pay for the collection made, and for the services of an attendant to watch over it during the Exposition. For these expenditures, proper vouchers were presented and filed.

Pennsylvania Geological Survey's Collective Display

The collection was exhibited in the Mineral Annex to the Main Building, and embraced models of mineral regions of Pennsylvania, structure illustrations by means of rock specimens and diagrams, and geological collections of rocks and the minerals contained therein. As a collective display, it was, of course, not so extensive and varied as those of Ohio, Missouri, Indiana, West Virginia and other States, for which funds had been provided, and collections made long previously. All the illustrations and specimens presented, however, were first-class, and were suitably recognized through awards made by the Commission. Considering the limited time and means at the disposal of Professor Pearse, the exhibit was highly creditable to himself and the Geological Survey. Still, candor compels us to say, that it was not in variety and extent all that might reasonably have been expected from a State possessed of such boundless mineralogical resources as Pennsylvania, or as might readily have been prepared, if the requisite means had been furnished in time.

Mineralogical Collection in the Government Building.

In the collection illustrative of the mineral resources of the several States, exhibited in the United States Government Building, the ores, minerals, and metallurgical products of Pennsylvania were represented in the following group: Iron ore, flux and fuel; coal and coke; kaolin; limestone; limonite, specular iron, etc.; copper ores; copper and copper products; petroleum and petroleum products; glass and materials for its manufacture; window glass and materials; pig iron and ores; nickel and cobalt ores and products; cast steel; sheet iron; and chromite. This collection, like similar ones from other States, was in charge of Mr. W. P. Blake, and was both curious and attractive. The principal objects were to illustrate the nature and variety of our mineral resources; the geographical distribution and geological associations of the minerals, and the extent to which they have been utilized; the mechanical, metallurgical, and chemical processes by which the useful products are extracted or produced; and the inherent and comparative qualities of the extractive products.

Philadelphia's Centennial Post Office.

Another representation, collective in its character, which was made in the United States Government Building, is justly entitled to notice here. The Centennial Post Office, although under the control of the National authorities, was but a branch or station, yet a very important one, of the Philadelphia Office, and as such may fairly be ranked as a Pennsylvania exhibit. It was designed both for public accommodation and to show the practical workings of the following divisions of the Post Office Department, viz.: Box and general delivery system; system of carrier delivery and collections; registered letter system; money-order system; foreign mail system, etc. It was admirably fitted up and arranged, and, under the able management of Mr. G. W. Fairman, then Postmaster at Philadelphia, and his obliging corps of assistants, it was not only a great convenience to visitors and all connected with the Exposition, but really proved itself in all respects a model working Post Office.

Appropriation to Live Stock Exhibition.

At a special meeting of the Board and Advisory Committee, held August 30, 1876, a communication from Mr. Burnet Landreth, Chief of the Agricultural Bureau of the International Exposition, was read, requesting the Board to make an appropriation in furtherance of the serial displays of neat cattle, commencing September 21st, and sheep and swine, commencing October 10th. Regarding the object as highly meritorious, and anxious to promote it as far as practicable, the Board appropriated the sum of two hundred and fifty dollars ($250), or so much thereof as might be required, to enable Mr. Landreth to employ a suitable person to canvass and otherwise aid in securing a proper display of live stock from Pennsylvania—the amount to be paid on presentation of vouchers showing the expenditures. The gentleman delegated by Mr. Landreth did some traveling and made considerable effort in correspondence to further the object in view; and, on the recommendation of Mr. Landreth, his claim has been certified to the Auditor General for fifty dollars ($50), which amount, considering the nature of the services rendered, is deemed but a moderate compensation

Pennsylvania's Military Display.

As one of Pennsylvania's exhibits at the Exposition, her military demonstration deserves to be noticed at some length. In the judgment of the Board, it formed no small part of the many interesting features attending the Centennial Anniversary. By an Act, approved April 7, 1876, the sum of twenty thousand dollars ($20,000) was appropriated for the purchase of canvas for the quartering and accommodation of the troops, and the further sum of thirty-five thousand dollars ($35,000) for their transportation and carriage from their respective localities to the encampment and return, and for the payment of the rental of the necessary grounds and other incidental expenses.

The Encampment of Troops.

Through the favorable action of the Fairmount Park Commission, about two hundred and sixty acres of the Park grounds were placed under the control of the Executive for the purposes of encampment therein by such organizations as might desire, under certain regulations and restrictions looking to the safety and preservation of the natural and artificial beauties of the Park. This arrangement being communicated to the Adjutants General of other States, a large number of their organized troops availed themselves of the invitation thus extended to them to visit Pennsylvania. These representative organizations of sister States, during their visits to the Centennial City, afforded to the hosts of people there assembled the only real opportunity ever extended in time of profound peace to witness the workings and results of the National Guard and various Militia systems of the United States. Our military guests numbered between nine and ten thousand men, including a number of organizations present, but not availing themselves of the facilities for encampment.

Parade on Opening Day.

At the opening ceremonies on the 10th of May, the military acted as an escort of the President of the United States. The line was made up of the First Division National Guard of Pennsylvania and other organizations from the immediate vicinity of Philadelphia, with the Spanish Royal Engineers, United States Marines, League Island Station, Sailors from the United States Steamer "Congress," the Boston Cadets and Boston Lancers, and the Cadets from the Pennsylvania Military Academy at Chester, Pennsylvania. The duties, though evidently severe and fatiguing, seemed cheerfully and well performed, and the bearing and deportment of the officers and men were made the subject of favorable comment both by the authorities and the spectators.

Parade on Centennial Day.

The parade on July 4th—our real Centennial Day—was the characteristic demonstration. It was unquestionably the best representative display of the military organizations of the several States, which has ever been witnessed under the prescribed peace system. In addition to the First Division National Guard of Pennsylvania, commanded by the lamented Major General John P. Bankson, to whose able management and control were intrusted all details of route, formation and assignment, troops from the following States were in line: New York, Michigan, Massachusetts, Rhode Island, Vermont, Virginia and Texas. There were also in line troops from the District of Columbia, the Spanish Royal Engineers, the Cadets of the United States Military Academy, the United States Marines, and the Centennial Legion, this being an especially attractive feature composed of a representative organization from each of the thirteen original States. It was commanded by General Harry Heth, of Virginia, and embraced the following named organizations: First Light Infantry Regiment, Rhode Island; Clinch Rifles, Georgia; Phil. Kearney Guards, New Jersey; American Rifles, Delaware; detail from the Fifth Regiment, Maryland; Boston Light Infantry, Massachusetts; Washington Light Infantry, South Carolina; Old Guard (Veteran Battalion), New York; Fayetteville Light Infantry, North Carolina; First Battery, New Hampshire; New Haven Grays, Connecticut; State Fencibles, Pennsylvania, and First Light Artillery Blues, Virginia. The column, which aggregated fifty-six hundred and sixty-five (5665) men, was reviewed in front of Independence Hall from a stand erected for the purpose, and on which were General Sherman, U. S. A.; Prince Oscar, of Sweden; Centennial Commissioners from various foreign countries; Executive and military officers from the several States, and representatives of the armies and navies of this and other governments. The display was well received by the people, and was warmly complimented by the distinguished officials on the stand.

Military Guests from other States.

At various other times during the Exposition, Philadelphia was visited by National Guard Troops and Militia from New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland, Ohio and Michigan. Adjutant General Latta informs the Board of Managers, that, from data received from the Adjutants General of other States and from reports of commands made to him personally, he estimates the entire number of the visiting soldiery during the year at nine thousand seven hundred and sixty-eight (9768).

"Camp Anthony Wayne."

Thursday, August 3, 1876, saw the commencement of the most successful peace encampment of her military that Pennsylvania had ever undertaken, and which, in its magnitude, excelled all her former demonstrations under like circumstances, and it is believed, too, those of any of her sister States. The appropriation of public funds being limited in its application, the service was purely voluntary, the troops paying all expenses for subsistence and such other necessities as arose outside their transportation.

The average attendance at the Exposition, when the encampment began, had not met the expectations of the Centennial Commission, or given sure promise of what it finally attained. The introduction of our citizen soldiery just at this period contributed largely to increase the number of visitors, and was but one of the numerous proofs of the determination of the authorities and people of our Commonwealth to see to it that the International Exhibition should in no wise fail.

The place of encampment, which was known as "Camp Anthony Wayne," was in the West Park, and extended from Belmont Mansion on either side of Chamouni Drive to Prospect Mansion, the headquarters of the Governor and Commander-in-chief being located about midway up the Drive.

Reviews and Street Parade of August 10th.

During the encampment the entire Guard was reviewed by Divisions by the Commander-in-chief, these occasions proving very attractive to visitors. But perhaps the most striking feature of the encampment was the Street Parade in Philadelphia on the 10th of August. On that occasion the entire Guard, escorted by the First Division, participated, and the column of over seven thousand men marched with a steadiness and regularity which won the good opinion of all observers.

Close of the Encampment.

The encampment closed on the 14th of August, its entire strength, exclusive of musicians, being five thousand seven hundred and forty-one men. It demonstrated clearly that the Commonwealth even in times of peace fosters a powerful nucleus of the great armies which she can send forth when necessity unhappily calls for such service. Whilst proper military discipline was exercised and the requirements of camp-life strictly enjoined, yet leave was frequently given the men to visit the Centennial Grounds. Apart, therefore, from the instruction given in soldierly duties by the encampment, the opportunity of studying the great International Exposition which it extended to many of our citizens who might otherwise not have seen it, would make it appear that the funds appropriated by the Legislature had been profitably and wisely expended.

Pennsylvania's Educational Display.

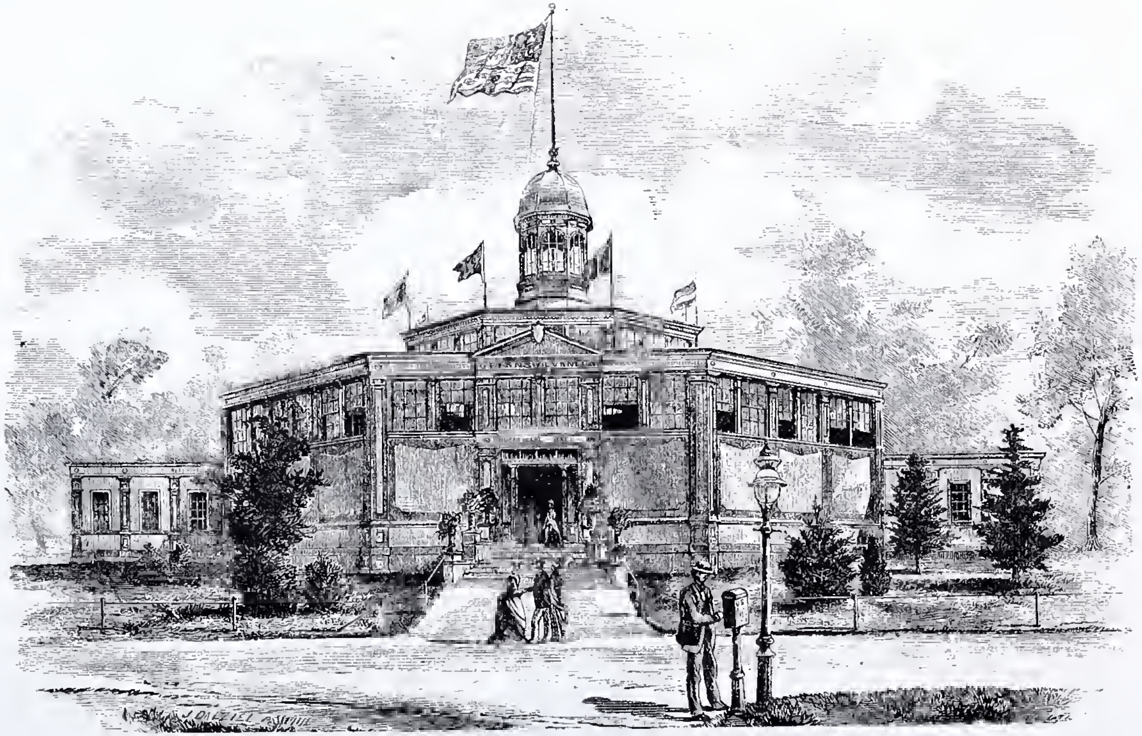
Under an Act of the General Assembly, approved March 28, 1876, the sum of fifteen thousand dollars was specially appropriated for the purpose of making a proper display of the educational interests of the Commonwealth at the Centennial Exposition, the organization and management of which was devolved upon the Superintendent of Public Instruction. To carry out this object, a special building was required, because when, about March 1, 1876, the matter was taken up in earnest, the Centennial Commission was unable to provide the requisite space in its own buildings. The amount appropriated would not in itself have been sufficient to erect a suitable structure and defray the expenses incident to the exhibit, but voluntary contributions were added to the sum by school boards, institutions and individuals, thus enabling Professor Wickersham, the State Superintendent, to undertake and complete the construction of the edifice known as Pennsylvania Educational Hall. This building—located north of and in close proximity to the Art Gallery—was a frame structure, octagonal in shape; and its size, excluding the two wings, was 100 feet by 100 feet. The wings were each 40 feet by 24 feet. It was well lighted and ventilated, and its internal arrangement admirably adapted it to the purposes for which it was designed.

Educational Exhibits.

The exhibits consisted of representations of Kindergartens; systems of Graded Schools; Schools of Counties; Academies and Seminaries; Universities and Colleges; Technical Schools and Departments; Normal Schools and Schools of Design; Institutions for the Deaf, Dumb, and Blind; Orphan Schools and Sunday Schools; and Commercial and Business Colleges. The display embraced views, plans and models of school buildings and other educational institutions, with appropriate furniture, fittings, and ornamentation, and systems of heating, lighting and ventilating; historical and statistical charts, maps, drawings, paintings, photographs, and specimens of penmanship; text books, reports, forms, certificates, laws, courses of study, methods of teaching, scholars' work, school and philosophical apparatus, etc., with an elaborate and interesting exhibit from the Department of Public Instruction, showing the statistics and outline of the public school system.

Contributors to the Educational Display.

With perhaps two or three minor exceptions, the contributions were all from Pennsylvania, the contributors being: Kindergartens, 7; Districts and Counties, 28; Cities and Boroughs, 20; Academies and Seminaries, 15; Colleges, 15; Normal Schools, 8; Soldiers' Orphan Schools and Homes, 21; Institutions for the Blind and for Feeble Minded Children, 2;



Pennsylvania Educational Hall.

Schools of Design and of Elocution and Oratory, 2; Sunday Schools (collective exhibit), 1; American Literary Union, 1; Department of Public Instruction, 1; Book Publishers, 8; Manufacturers of School Furniture, 4; Manufacturers of School and Philosophical Apparatus, 13; and Miscellaneous Contributors, 5; in all, 151. All the material displayed, it is stated, was furnished in response to a request for it, and not a single article sent in was rejected. The scholars' work was, therefore, considered no more than a fair sample of the work generally done in the schools whence it was received.

THE EDUCATIONAL DISPLAY A SUCCESS.

A special report of this display has been made by the distinguished gentleman who had it in charge, but as a State exhibit, the Board have felt it their duty to refer to it at some length, and they avail themselves of the occasion to join publicly in the high commendation which it has generally received. Sixteen other States of the Union, namely: Connecticut, Illinois, Indiana, Iowa, Maryland, Maine, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, New Hampshire, Ohio, Rhode Island, Tennessee and Wisconsin, had similar educational exhibits in the galleries of the Main Building. It is believed, however, that for most, if not all, of these space had been secured and extensive collections and arrangements made before it was certainly known that Pennsylvania would undertake a collective display of her educational interests; and whilst the exhibits of the several States named attracted great interest and were really meritorious, yet it seems to have been generally conceded that the representation in Educational Hall justly entitled the Keystone State to bear away the palm.

INDIVIDUAL EXHIBITS FROM PENNSYLVANIA.

It should be observed that in this preliminary report, comments in reference to particular exhibits have been restricted, *first*, to such as were directly under the patronage of our State, and which were collective in their nature; and, *secondly*, to those which were representative of the resources and capabilities of our State, but which were presented under the auspices of the General Government. Any special remarks which it may be desirable to offer in relation to the Exposition itself, or to individual displays or groups or classes of exhibits from Pennsylvania, will be reserved until the catalogue has been completed and the Board shall come to make their final report. Meantime, the following synopsis, prepared in advance, will show the several Departments, Classes and Groups, and the number of Pennsylvania exhibits represented therein respectively:

CLASSIFICATION OF PENNSYLVANIA EXHIBITS.

DEPARTMENT I.—MINING AND METALLURGY.

CLASSES.	GROUPS.	EXHIBITS.
100—109.	Minerals, Ores, Stone, Mining Products	143
110 -119.	Metallurgical Products	88
120—129.	Mining Engineering	2
		233

DEPARTMENT II.—MANUFACTURES.

CLASSES.	GROUPS.	EXHIBITS.
200—205.	Chemical Manufactures	131
206—216.	Ceramics, Pottery, Porcelain, Glass, etc	46
217—227.	Furniture, etc	244
228—234.	Yarns and Woven Goods of Vegetable or Mineral Materials	29
235—241.	Woven and Felted Goods of Wool, etc	43
242—249.	Silk and Silk Fabrics	10
250—257.	Clothing, Jewelry, etc	163
258—264.	Paper, Blank Books, Stationery	53
265—271.	Weapons, etc	9
272—279.	Medicine, Surgery, Prothesis	46
280—284.	Hardware, Edge Tools, Cutlery and Metallic Products	92
285—291.	Fabrics of Vegetable, Animal, or Mineral Materials	26
292—296.	Carriages, Vehicles and Accessories	39
		931

DEPARTMENT III.—EDUCATION AND SCIENCE.

300—309.	Educational Systems, Methods and Libraries	173
310—319.	Institutions and Organizations	4
320—329.	Scientific and Philosophical Instruments and Methods	88
330—339.	Engineering, Architecture, Maps, etc	36
340—349.	Physical, Social and Moral Condition of Man	39
		340

DEPARTMENT IV.—ART.

400—409.	Sculpture	26
410—419.	Painting	112
420—429.	Engraving and Lithography	39
430—439.	Photography	46
440—449.	Industrial and Architectural Designs, etc	11
450—459.	Ceramic Decorations, Mosaics, etc	17
		251

DEPARTMENT V.—MACHINERY.

500—509.	Machines, Tools, etc., of Mining, Chemistry, etc	43
510—519.	Machines and Tools for working Metal, Wood and Stone	109
520—529.	Machines and Implements of Spinning, Weaving, etc	19
530—539.	Machines, etc., used in Sewing, making Clothing, etc	38
540—549.	Machines for Printing, making Books, Paper Working, etc	33
550—559.	Motors, Power Generators, etc	114
560—569.	Hydraulic and Pneumatic Apparatus	78
570—579.	Railway Plant, Rolling Stock, etc	71
580—589.	Machinery used in preparing Agricultural Products	28
590—599.	Aerial, Pneumatic and Water Transportation	27
	* Machinery and Apparatus, especially adapted to the requirements of the Exhibition	
		560

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* These are embraced in the other classes of the Department of Machinery.—*Board of Managers.*

DEPARTMENT VI.—AGRICULTURE.

CLASSES.	GROUPS.	EXHIBITS.
600—609.	Arboriculture and Forest Products	14
610—619.	Pomology	65
620—629.	Agricultural Products	73
630—639.	Land Animals	406
640—649.	Marine Animals, Fish Culture, and Apparatus	30
650—662.	Animal and Vegetable Products	215
665—669.	Textile Substances of Vegetable or Animal Origin	11
670—679.	Machines, Implements and Processes of Manufacture	198
680—689.	Agricultural Engineering and Administration	72
690—699.	Tillage and General Management	12
		1096

DEPARTMENT VII.—HORTICULTURE.

700—709.	Ornamental Trees, Shrubs and Flowers	70
710—719.	Hot Houses, Conservatories, Graperies	27
720—729.	Garden Tools, Accessories of Gardening	23
730—739.	Garden Designing, Construction, and Management	4
		124

RECAPITULATION.

Department I.—Mining and Metallurgy	233
" II.—Manufactures	931
" III.—Education and Science	340
" IV.—Art	251
" V.—Machinery	560
" VI.—Agriculture	1096
" VII.—Horticulture	124
* WHOLE NUMBER OF PENNSYLVANIA EXHIBITS	3535

PENNSYLVANIA PRE-EMINENT IN INDIVIDUAL DISPLAYS.

Pennsylvania largely exceeded every other State in the number of her exhibitors and in the variety of their exhibits. Comparisons under these heads will be instituted in the catalogue, and reference will also be made to awards received. The individual displays were both in number and character altogether creditable to our State.

THE WANT OF A COLLECTIVE EXHIBIT.

The Board cannot dismiss the subject of exhibits without again expressing their regret that they were not furnished in time with the

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* The re-publication of the Preliminary Report affords an opportunity to present this statement in a more complete form than that in which it originally appeared. In the preparation of the Catalogue of Pennsylvania Exhibitors, the Secretary has, upon reliable data in his possession, added a number of exhibitors' names which were not embraced in the Exposition Catalogue, and has also corrected certain errors apparent in the official classification of Pennsylvania Exhibits. These amendments have necessarily led to corresponding changes in the original figures, but the statement, as now submitted, will be found all the more trustworthy on that account. Made in the form of the official synopsis of the classification, the statement is designed to show—not the number of Pennsylvania Exhibitors—but the number of Pennsylvania Exhibits as classed under the various groups. The number of Pennsylvania Exhibitors will be found in the Final Report.—*Id.*

requisite means to provide a collective representation of the history, resources and capabilities of the State. The appropriation of forty thousand dollars ($40,000), it is believed, would have been sufficient for all the purposes of the management, inclusive of this object, if it had only been more seasonably made. Had the ten thousand dollars ($10,000) contemplated by the original bill been given, the collection of the necessary material might at once have been commenced, and, in the absence of a special edifice, the space required for the display might have been secured in one of the Exposition Buildings. Then, had the Legislature, at the beginning of the session of 1876, seen fit to supplement that appropriation with another of thirty thousand dollars ($30,000), the State Building might readily have been constructed with a view to such exhibit, the collection might at once have been removed to it, and the space to be surrendered in the Exposition Building would gladly have been occupied by other exhibitors. To this collection might have been applied a considerable sum which could readily have been saved in the erection of the State Building, if reasonable time had been given for that work. The few weeks in which the structure was required to be built, happened at the very time when materials and skilled workmen were in the greatest possible demand, and none but contractors possessed of the amplest facilities and resources could have been induced, at any price, to undertake the construction and give the requisite guaranty for its completion within so limited a period.

"Where are your exhibits?" was frequently asked at the Pennsylvania Building. The visitor was directed to any or all of the Main Exposition Buildings and to many of the special structures; he was told that everywhere upon the grounds were to be found representations of Pennsylvania's products and resources, and evidences of her enterprise and prosperity. "What, then, is the object of this Building?" Its advantages and conveniences to Pennsylvanians, and to all who visited it, were pointed out; but still the inquirer would seem surprised that it did not contain a collective exhibit similar to those in other State structures on the grounds.

It was indeed difficult to assign a satisfactory reason for the absence of a collective exhibit on the part of our State. It is not pretended that she should have grouped her entire representation. An edifice as large as Machinery Hall itself would have been inadequate to such a purpose. Besides, even had it been practicable, it would have been mistaken policy. She had the advantage of having the Exposition on her own territory, and to localize or concentrate her various displays at one point would have overshadowed all other attempts and repelled competition rather than invited it. It was wise, therefore, to distribute her exhibits: she could afford it. But, admitting this, the necessity for her representation through a proper collection was none the less apparent.

Recall, if you please, the collective exhibits of West Virginia, Kansas, and Colorado. They were amongst the most interesting features of the

Exposition, and were admirable schools wherein to study the history and resources of those States. Cereals, grasses, fruits and other productions of the soil; mineral, geological and ornithological specimens; various kinds of wood and soil; cabinets of petrifactions and stuffed animals, etc., were most tastefully displayed, and with the maps and other means of information which were presented, they gave to visitors the clearest perceptions as to the advantages possessed by those States. Manifestly, the tides of emigration and capital flowing therein will not be diminished by these collective exhibits, for they afforded an admirable means of advertisement.

It was earnestly desired by the management that Pennsylvania should be similarly represented; that she should, indeed, present just such a collective display as was recommended in January, 1875, by the Centennial Commission through the letter of the Director General to Governor Hartranft. It was due to her that the history of her birth and early struggles as a State should be contrasted with the high measure of prosperity which she now enjoys. Her progress in the tillage of the soil, in utilizing minerals, in manufactures, in the means of transit and communication, in the arts and sciences, and in all that tends to the moral, social and material advancement of a community, should have been set forth, together with a comprehensive display of her natural and artificial productions. Official resources would have been ample. Topographical and geological maps, models, and statistical and scientific data could readily have been collected and prepared. Institutions, as well as individuals, would cheerfully have furnished objects and information, and the various departments at Harrisburg and the repositories in Philadelphia and other cities would have yielded rich and rare contributions. Historic paintings; portraits of the Colonial and State Governors, of the Presidents of the Supreme Executive Council, and of other distinguished personages of the past; specimens of ancient fabrics and handiwork; ancestral relics; Indian curiosities; and quaint old records and manuscripts, with which our public archives abound, might all have been displayed in a manner both interesting and instructive, especially when contrasted with the processes and productions of the present day. If it be suggested that it would have been unwise to have exposed such a collection to the hazard of possible destruction by fire, with the consequence of irreparable loss, it may be answered that a similar risk was taken even with the sacred relics of the Father of his Country, which, with many like memorials, were displayed in the United States Government Building, and constituted one of the finest characteristics of that excellent exhibit. In no other way could the genius, habits and resources of the early settlers, and the wonderful advancement and prosperity of our Commonwealth, have been so fitly illustrated. But time and pecuniary means were required to prepare and organize such a collection; and the appropriation came too late.

Historical and Statistical Record.

To compensate in some degree for the want, at the Exposition, of a collective representation such as has been described, it has seemed to the Board that a permanent record should be made of the history, resources and capabilities of our State, which would illustrate her progress prior to, and her social, commercial, industrial and financial status during the Centennial year. For this purpose statistics and historical data have been collected, which, under the advice and with the assistance of competent experts in certain specialties, will be collated and arranged by the Secretary, and presented as part of the final report of the Board. This, in connection with the forthcoming catalogue and the admirable addresses on Pennsylvania Day, will furnish to those who shall come after us, ample and reliable evidence of the remarkable growth and prosperity of our Commonwealth, and the wondrous wealth and strength which she exemplified at the Centenary of the Nation's Birth. The necessity and propriety of such a record, the Board feel assured, will readily be conceded.

Aid to the Centennial.

It has been common to characterize the Exposition as Pennsylvania's or Philadelphia's Show, and not unfrequently the latter designation has come from rival cities with a tinge of irony. But, however made or intended, the remark contains a great deal of truth. It must not be forgotten, that, whilst the Centennial authorities derived their functions, and the Exhibition its international character, from the General Government, the organic law expressly exempted the Nation from any pecuniary liability in the premises. No financial aid whatever was voted by Congress, until the principal buildings had been erected and the success of the vast undertaking had been assured beyond question. Even then, the appropriation of a million and a half of dollars was made under conditions looking to its re-payment into the Federal treasury. But the want of substantial patronage from the Government, with the local jealousies and untold discouragements which they had to encounter, seemed only to quicken and to enlarge the accustomed energy and liberality of the patriotic citizens of Philadelphia and of our State. The movement once inaugurated, they realized that the issue of its prosperity or adversity rested with themselves; and, accepting the responsibility, they resolved to accomplish success where many had predicted failure. Their efforts were nobly seconded by zealous and generous co-workers in other States, and with them they gladly share the credit and the glory of the grand and incomparable achievement of the Centennial Exposition.

Centennial Stock.

The following table, prepared from data furnished by the Centennial Board of Finance, is given for purposes of comparison, and explains itself:

STATES.	No. of Shares subscribed by States.	No. of Shares subscribed by individuals	Total No. of Shares subscribed	Paid.
Alabama		71	71	$492.00
Alaska				
Arizona		124	124	1,024.00
Arkansas		4	4	32.00
California		945	945	9,406.00
Colorado				
Connecticut	1,000	872	1,872	17,600.00
Dakota				
Delaware	*1,500	607	2,107	13,404.00
District of Columbia		362	362	2,982.00
Florida		25	25	130.00
Georgia		27	27	270.00
Idaho		71	71	710.00
Illinois		1,701	1,701	15,824.00
Indiana		25	25	234.00
Iowa		7	7	66.00
Kansas		7	7	40.00
Kentucky		105	105	1,050.00
Louisiana		121	121	692.00
Maine		68	68	680.00
Maryland		858	858	7,936.00
Massachusetts		3,350	3,350	33,462.00
Michigan		240	240	2,342.00
Minnesota		10	10	100.00
Mississippi		2	2	20.00
Missouri		22	22	120.00
Montana		13	13	114.00
North Carolina		12	12	120.00
Nebraska		83	83	790.00
Nevada		70	70	700.00
New Hampshire	1,000	54	1,054	10,540.00
New Jersey	10,000	2,720	12,720	106,574.00
New Mexico				
New York		28,407	28,407	266,922.00
Ohio		392	392	3,088.00
Oregon		471	471	2,334.00
Pennsylvania		187,218	187,218	1,749,468.00
Rhode Island		2,633	2,633	26,322.00
South Carolina		5	5	50.00
Tennessee		7	7	64.00
Texas		18	18	180.00
Utah				
Vermont		67	67	670.00
Virginia		45	45	354.00
Washington Territory		7	7	70.00
West Virginia		7	7	70.00
Wisconsin		124	124	894.00
Wyoming Territory				
FOREIGN COUNTRIES:				
England		50	50	500.00
France		45	45	450.00
China		1	1	10.00
Prussia		1	1	10.00
Spain		1	1	10.00
Sweden		1	1	10.00
Switzerland		2	2	20.00
TOTALS	13,500	232,078	245,578	$2,278,950.00

It thus appears that the aggregate of subscriptions to stock was two hundred and forty-five thousand five hundred and seventy-eight (245,578)

* Including 500 shares subscribed by the City of Wilmington.

shares; and that the total amount paid thereon, up to December 15 1876, was two million two hundred and seventy-eight thousand nine hundred and fifty dollars ($2,278,950). The manner of its distribution, and the part borne by Pennsylvanians, are shown by the following

COMPARATIVE SUMMARY.

	SHARES.	PAID.
Pennsylvania—Individual subscriptions	187,218	$1,749,468.00
Other States and citizens thereof	58,259	528,472.00
Foreign subscriptions	101	1,010.00
Total amounts subscribed and paid	245,578	$2,278,950.00

PENNSYLVANIA'S CONTRIBUTION.

The various sums contributed for Centennial purposes by Pennsylvania and her citizens, exclusive of paid admissions, are shown by the following

STATEMENT.

Centennial Stock	$1,749,468.00	
Donations	50,000.00	$1,799,468.00
PHILADELPHIA CITY APPROPRIATIONS:		
February 28, 1872	$25,000.00	
November 4, 1872	50,000.00	
February 22, 1873	500,000.00	
April 2, 1874	1,000,000.00	1,575,000 00
PENNSYLVANIA STATE APPROPRIATIONS:		
Memorial Hall	$1,000,000.00	
State Board	40,000.00	
Educational Display	15,000.00	
Military Display	55,000.00	1,110,000.00
Grand total		$4,484,468.00

PENNSYLVANIA'S MUNIFICENCE TOWARDS THE EXPOSITION.

Our people have reason to be proud of this exhibit. Contrast their timely munificence with the tardy and stinted appropriation of a million and a half of dollars by the General Government.

In addition to the stock taken by States other than Pennsylvania, the following States and Territories, viz.: Arizona, Arkansas, Colorado, Connecticut, Delaware, Illinois, Indiana, Kansas, Massachusetts, Michigan, Minnesota, Missouri, Montana, Nevada, New Hampshire, New Jersey, New York, Ohio, Oregon, West Virginia and Wisconsin, appropriated in the aggregate about three hundred thousand dollars ($300,000), for the erection of State Buildings, and for the representation of their natural and productive interests at the Exposition. Adding to this sum all the paid stock subscribed for outside of our State, together with the one million and a half of dollars voted by Congress, and the whole is comparatively but little in excess of the one-half of Pennsylvania's contribution.

These comparisons have not been instituted for the purpose of disparaging other States, but as a simple act of justice to our own Commonwealth. It was on her soil that American Independence was first proclaimed; and what she did to achieve it glows with no common lustre upon the historic page. Nor was her revolutionary glory dimmed, when, on the same soil, the representatives of all the civilized powers united in celebrating the One Hundredth Anniversary of the Nation's Birth, honoring it, as they did, by the most imposing and most successful peace demonstration the world has ever known. The noble work which Pennsylvania did to bring about this wondrous consummation, the facts and figures well attest: let them tell the story to posterity.

FINANCIAL STATEMENT.

The following summary, compiled from the books of the Treasurer of the Board, will exhibit the character and amounts of the various expenditures, viz.:

Architect, Plans, Specifications, Superintendence, etc	$838.75
Building, Additions, and Repairs	17,496.43
Carpets, Matting, etc	838.48
Coal	28.00
Expressage and Freights	17.21
Flags and Decorations	344.25
Furniture	1,502.27
Gas	25.16
Gas Fixtures	628.42
Geological Survey, for Collective Display	777.36
Ice	54.82
Insurance on Building and Furniture	140.00
Ornamenting Grounds	500.00
Postage Stamps	143.06
Salaries	5,163.00
Stationery, including Printing	493.72
Stoves and Fixtures	117.20
Telegrams	38.96
Washing, Ironing, Blacking, and other incidentals	111.66
TOTAL	$29,258.75

It thus appears that, of the forty thousand dollars ($40,000), appropriated by the supplement approved March 30, 1876, the Board have expended twenty-nine thousand two hundred and fifty-eight dollars and seventy-five cents ($29,258.75), leaving an available balance in the treasury of ten thousand seven hundred and forty-one dollars and twenty-five cents ($10,741.25), a portion of which will, of course, be required to defray the expenses incident to the preparation of the catalogue and final report of the Board.

A bill of seventy-six dollars and eleven cents ($76.11), for gas furnished the State Building, and a bill of fifty dollars ($50.00), for services and expenses in promoting the Pennsylvania Live-Stock Display, have been certified to the Auditor General, but are not included in the foregoing statement. With these exceptions, the statement embraces all the expenditures or liabilities incurred, save the cost of printing this report, and perhaps one or two bills of trifling importance.

Economy in Expenditures.

The fund intrusted to the Board has been carefully, and, it is believed, economically and judiciously expended Not a dollar of it has been employed in the purchase of luxuries of any character. Considering the daily expenses necessarily incurred by the attendants at the Building, in going to and from, and whilst upon, the grounds, the salaries allowed them can only be regarded as moderate. Although, under the provisions of the Supplemental Act, compensation was expressly denied the Commission, actual expenses would perhaps have been a legitimate charge. In attending the various meetings, and in otherwise looking after the affairs of the Board, some of the Managers were put to no little inconvenience and expense, yet each one early announced his determination to accept nothing even by way of reimbursement This remark applies as well to the gentlemen composing the associated Committees. Every one has cheerfully borne his own expenses. In advancing the important interests confided to them, the entire management were glad to labor freely; and they have found a far more grateful reward in the success which attended their efforts than could possibly have been derived from any pecuniary recompense.

Official Courtesies and Co-operation.

The personal and official relations between the Board and the gentlemen composing the Advisory and Legislative Committees have been of the most cordial character, and the Board take pleasure in acknowledging the hearty and efficient co-operation rendered by those bodies in promoting the objects and success of the management. The thanks of the Board are due and are hereby tendered to the members of the press throughout the State for valuable assistance freely given; also to the officers and members of the Centennial Commission and Board of Finance, and to the heads of the various Bureaus, for official courtesies; and to Hon. Thomas Cochran, Col. Myer Asch, Gen. C. B. Norton, Captain W. A. Hoyt and Mr. H. S. Lansing, for special favors.

Conclusion.

The grand and paramount functions of International Exhibitions are to stimulate invention, to encourage enterprise, to honor labor, and to educate the people. These objects were attained through the Centennial Exposition. Its influence has been wide-spread, and its results will mark an era in the march of civilization. In conclusion, the Board of Managers congratulate the Legislature, to whose care and guardianship the interests and welfare of our noble Commonwealth are largely confided, upon the part she has taken in the great work. May her future be as bright as her past has been glorious!

By order of the Board,

A. C. MULLIN,
Secretary.

FINAL REPORT.

FINAL REPORT
OF
THE PENNSYLVANIA BOARD
OF
CENTENNIAL MANAGERS.

MADE TO THE LEGISLATURE, AT THE SESSION OF 1878.

To the Honorable the Senate and House of Representatives of the Commonwealth of Pennsylvania:

Gentlemen:—The Pennsylvania Board of Centennial Managers, in accordance with the Act of Assembly under which they were appointed, have the honor to submit the following as their

FINAL REPORT.

Since the presentation of their Preliminary Report, the official duties of the Board have been restricted to the settlement of unfinished business and to a general supervision of the compilations which accompany this report. In the fulfilment of these objects, but few meetings of the Board and Associated Committees have been required, and the closing record of the transactions of the Management will, therefore, necessarily be brief.

Catalogue and Historical Record.

In the Preliminary Report of the Board, presented to the Legislature at its last session, it was stated that a Catalogue of Pennsylvania Exhibitors and Exhibits was in course of preparation, and that statistics and historical data had been collected, which, with the aid of competent experts in certain specialties, would be collated and arranged by the Secretary, and be submitted as part of the Final Report of the Board. The object of this compilation, as stated, was twofold: *first,* to compensate in some degree for the want, at the Exposition, of such a collective representation on the part of the State as might and would have been prepared if the requisite appropriation had been seasonably made; and, *secondly*, to transmit to posterity, in an authentic and durable form, some evidence of the growth and prosperity of our Commonwealth and the wealth and strength which she exemplified, through her people, at the Centenary of the Nation's birth.

Progress of the Compilation—Approval in Joint Meeting.

At a Special Joint Meeting of the Board and Advisory Committee, held in this City, on the 17th March last, specimens in manuscript, indicating the character of the proposed compilation, were examined and approved, and the Secretary was instructed to proceed with the work. On the 7th of the following month (April), at a Joint Meeting representing the Board and all the Associated Committees, the subject was again introduced and considered, and the action of the Management endorsed by the unanimous adoption of the following Resolution offered by Senator Jones:

> *Resolved,* That the Preliminary Report of the Pennsylvania Board of Centennial Managers, with the financial statement, and the suggestions which it contains, meets our hearty approval.

Authority Delegated to the President.

It was also agreed at this meeting, that whatever expenses might be incurred in the preparation and printing of the Final Report and Accompanying Documents should be certified in the usual manner by the President, and be paid out of the unexpended balance of the State Centennial Fund.

Many reasons were apparent why the record should be completed in Philadelphia, and be presented in book form under the direction of the Board. This City has necessarily been the headquarters of the State Management as well as of the United States Centennial authorities. The gentlemen composing the Board and Associated Committees were accordingly best enabled here to witness the progress of the compilation, and, if deemed advisable or expedient, to offer suggestions respecting it. Located here, the offices of the Centennial Commission and Board of Finance were the more readily accessible as official information or advice might from time to time be required. Besides, very naturally, this City furnished the great body of the Pennsylvania Exhibitors, and here they could best be consulted when errors and omissions in the Official Catalogue, touching their names, or the location, character, or classification of their exhibits, had to be corrected or supplied. Moreover, the general nature of the compilation, much of it being technical, required close and critical supervision in order that typographical errors might be avoided and the letter-press presented in as clear and perfect a form as possible; and this supervision, it seemed to the Management, could be most successfully and satisfactorily exercised through the officers of the Board, who are resident here, and who were immediately connected with the preparation of the work.

THE QUESTION OF PUBLICATION RE-SUBMITTED.

The fund at the disposal of the Board did not warrant the publication of a sufficient number of copies of the compilation to provide for its liberal and proper distribution throughout the State. It was decided, therefore, to limit the issue to one thousand (1,000) copies, and to have the forms electrotyped, so that—the plates being the property of the Commonwealth—the Legislature might, if deemed expedient, from time to time order additional editions to be printed therefrom.

The President did not fail to appreciate the mark of confidence shown him by his Associates, when, at the Joint Meeting of April 7th, they placed the matter of expenses connected with the publication entirely under his own control. But, after an examination of the manuscript in its more advanced stage on the 11th July last, although it met both his official and personal approval, he was nevertheless apprehensive that the work had attained larger proportions, and would, in its completion according to the proposed plan, involve a greater expenditure than might have been anticipated by the other gentlemen connected with the Management when they so generously gave him discretionary authority over the subject. The President hesitated, therefore, to order the printing and electrotyping to be done without again consulting the Board and Advisory Committee.

PUBLICATION AGAIN RECOMMENDED BY THE MANAGEMENT.

As a meeting in this City at that time would, in consequence of the intense heat then prevailing, have been impracticable, or would at least have entailed personal inconvenience and discomfort upon members coming from a distance, an epitome indicating the character of the compilation, with an estimate of the probable cost of printing, electrotyping, and binding an edition of one thousand (1,000) copies, was prepared and forwarded to each member of the Board and Advisory Committee, requesting him, after fully considering the subject, to communicate his views thereon to the President. The responses from the several members were unanimous that the work should be completed in the manner suggested. This has accordingly been done, and the result is now submitted to the inspection and considerate judgment of the Legislature.

DISTRIBUTION OF THE WORK.

From the edition issued by the Board, each Member and Officer of the Legislature will be provided with a copy. His Excellency, the Governor, and the various Departments and Bureaus connected with the State government at Harrisburg; the United States Centennial Commission and Board of Finance; the Governors of the several States and Territories; and the various Foreign Commissions at the Centennial Exhibition, will also be furnished with copies. The remainder will be distributed amongst the various Municipal Authorities, Libraries, Public

Trusts and Commissions throughout the State, and amongst such other institutions and individuals as, by reason of their public character or connection with the Exposition, are, in the opinion of the Management, entitled to be so supplied.

The Pennsylvania Building.

The Supplemental Act, approved March 30, 1876, which made the appropriation for the erection, furnishing, maintenance and general management of the Pennsylvania Centennial Building, provided, as you are aware, that, at the expiration of the International Exposition, the structure, with its contents, should be sold, and the proceeds returned to the State Treasury. Satisfied from the result of numerous sales which had previously taken place on and near the Exposition Grounds, that only a fractional part of the actual cost of the establishment could be thus realized, and having a special regard for the associations connected with it, the Board, in their Preliminary Report, submitted in February last, recommended such legislation as would donate it to the City of Philadelphia, to be held in permanency on its site in Fairmount Park as a memento of the Centennial year. The suggestion was cordially endorsed by his Excellency, Governor Hartranft, who, it will be remembered, made it the subject of a special message to your honorable bodies on the second day of March last.

Communication from the Governor.

The President of the Board was officially informed of the legislative action taken in the matter through the following communication and enclosure:

[communication.]

EXECUTIVE CHAMBER,
Harrisburg, Pennsylvania,
April 4, 1877.

HON. MORTON McMICHAEL,
President Pennsylvania Board of Centennial Managers.

Sir:

I have the honor to transmit, herewith, a copy of certain concurrent resolutions of the Senate and House of Representatives of this State, relative to the transfer of the State Centennial Building, and the Furniture therein, to the City of Philadelphia.

I am, with much respect,
Your obedient servant,
J. F. HARTRANFT.

[enclosure.]

IN THE HOUSE OF REPRESENTATIVES,
Harrisburg, March 21, 1877.

WHEREAS, The Act making an appropriation for the erection of a State Building at the Centennial requires the said building to be sold when its use shall no longer be required:

AND WHEREAS, The Governor, in a message dated March second, recommends its donation to the City of Philadelphia, in order that so interesting a landmark may be preserved:

AND WHEREAS, There is not sufficient time this session to pass an Act of Assembly authorizing the transfer, to the City of Philadelphia, of the said Building and Furniture: Therefore,

RESOLVED (if the Senate concur), That the State Centennial Board of Managers be requested not to sell the Pennsylvania State Centennial Building nor the Furniture therein.

RESOLVED, That the sense of the Senate and House of Representatives is that the said Building and Furniture shall be donated to the City of Philadelphia, to be held by the said City.

RESOLVED, That the Governor be requested to transmit a copy of the Preamble and Resolutions to the State Board.

EXTRACT FROM THE JOURNAL H. R.

WM. C. SHURLOCK,
CHIEF CLERK H. R.

IN THE SENATE, March 20, 1877: The foregoing Resolutions concurred in.

THOS. B. COCHRAN,
CLERK.

APPROVED, the fourth day of April, Anno Domini one thousand eight hundred and seventy-seven.

J. F. HARTRANFT.

[Officially certified, April 4, 1877, by Hon. John B. Linn, Deputy Secretary of the Commonwealth.]

THE BUILDING AND FURNITURE DONATED TO PHILADELPHIA.

These papers were laid before the Board and Associated Committees at the earliest opportunity, namely, at a Joint Meeting held on the seventh day of April last, when the following Preamble and Resolution were presented by Mr. Huhn, and were, on his motion, unanimously adopted:

WHEREAS, The Act making an appropriation for the erection and furnishing of the Pennsylvania State Centennial Building, in Fairmount Park, required that, at the close of the International Exposition, said Building and Furniture should be sold and the proceeds thereof returned to the State Treasurer:

AND WHEREAS, By concurrent resolutions, since duly passed by the Legislature and certified by the Governor, the Pennsylvania Board of Centennial Managers have been requested not to sell said Building and Furniture, it being declared as the sense of the Senate and House of Representatives that the said Building and Furniture shall be donated to the City of Philadelphia, to be held by said City; THEREFORE,

RESOLVED, That in pursuance of the authority conferred by said concurrent resolutions, the President is directed to tender the said Building and Furniture to the City of Philadelphia, and that he is hereby authorized and empowered to execute the legal conveyance of the same.

CORRESPONDENCE WITH THE FAIRMOUNT PARK COMMISSION.

The following communication, together with an engrossed copy of the Preamble and Resolutions adopted at the Joint Meeting of the Board and Committees, was thereupon transmitted to the Commissioners of Fairmount Park:

[COMMUNICATION.]

PHILADELPHIA, APRIL 7, 1877.

TO THE COMMISSIONERS OF FAIRMOUNT PARK,
PHILADELPHIA.

GENTLEMEN:

By direction of President McMichael, I have the honor to transmit, herewith, a copy of a Preamble and Resolution, this day adopted at a Joint Meeting of the Pennsylvania Board of Centennial Managers and the several Committees associated therewith, and to tender to you, in accordance with the authority conferred upon him, the Pennsylvania State Centennial Building and Furniture, to be held as the property of the City of Philadelphia.

Very respectfully,
Your obedient servant,
A. C. MULLIN, SECRETARY.

The following communication and attested copy of resolutions were received in reply:

[COMMUNICATION.]

OFFICE OF THE COMMISSIONERS OF FAIRMOUNT PARK,
No. 251 SOUTH FOURTH STREET,
PHILADELPHIA, APRIL 14, 1877.

TO THE PENNSYLVANIA BOARD
OF CENTENNIAL MANAGERS.

GENTLEMEN:

I have the honor to transmit, herewith, a copy of Resolutions adopted by the Commissioners of Fairmount Park, accepting the Pennsylvania State Building and Furniture, in the Park, to be held as the property of the City of Philadelphia.

Very respectfully,
R. W. ROBBINS, SECRETARY.

[COPY OF RESOLUTIONS.]

OFFICE OF THE COMMISSIONERS OF FAIRMOUNT PARK,
251 SOUTH FOURTH STREET,
PHILADELPHIA, APRIL 14, 1877.

AT A MEETING of the Commissioners of Fairmount Park, held this day, the following Resolutions were adopted, viz.:

RESOLVED, That the Pennsylvania State Centennial Building and Furniture, in Fairmount Park so generously donated to the City of Philadelphia through the Commissioners of Fairmount Park, be accepted, and that the thanks of this body be and are hereby tendered to the State Centennial Board of Managers and the Associate Committees, representing the Legislature of Pennsylvania, for this valuable gift.

RESOLVED, That a copy of the Preamble and Resolution of the State Centennial Managers, tendering the said Building and Furniture to the City, be transmitted to Councils.

ATTEST:
R. W. ROBBINS,
SECRETARY PARK COMMISSION.

TRANSFER OF POSSESSION.

The Building and all its appointments having meanwhile been set in thorough order, possession of the entire establishment was transferred to the Commissioners of Fairmount Park on the 8th day of May last.

The Board of Managers cannot but congratulate your honorable bodies upon the wise and liberal character of the legislation which authorized this action. The gift was one eminently fit to be made, and as such it will be maintained and cherished by the authorities and people of the City of Philadelphia. So long as it shall endure, the Pennsylvania Building will prove an object of rare interest to the visitor in quest of memorials of the Centennial, whilst the many thousands who availed themselves of the opportunities which it afforded for rest and relaxation during the Exposition, will ever hold it in lively and pleasant remembrance.

The Geological Survey's Display.

The Legislature was informed, through the Preliminary Report of the Board, that, on the application of Professor John B. Pearse, Secretary of the Second Geological Survey of Pennsylvania, one thousand dollars ($1,000) of the Centennial fund had been set apart to defray the expenses of a scientific collection illustrative of the geology and minerals of the State, and that, of the amount so appropriated, seven hundred and seventy-seven dollars and thirty-six cents ($777.36) had been paid on presentation of the proper vouchers showing the actual expenditures. At the time this sum was paid, Professor Pearse intimated that an additional bill would be presented after the close of the Exposition. Anxious to include all such items of expenditure in their Preliminary Report, the Board waited until the 12th December, 1876, when, having heard nothing further from Professor Pearse, the Secretary was instructed to address him a communication inviting his attention to the subject. It appeared afterwards, however, that the Professor was absent from Philadelphia; hence no reply was received until the beginning of February of the present year, when, under date of January 30th, an answer reached the Board through Professor J. P. Lesley, the State Geologist, to whom Professor Pearse had referred the Secretary's communication some six weeks after it had been addressed to him. Professor Lesley's reply, although highly satisfactory in every other respect, came quite too late to be utilized in the preparation of the Preliminary Report.

Claim of Mr. John H. Harden.

Transmitting, with his communication, a claim of Mr. John H. Harden, of the University of Pennsylvania, for expenses incurred and services rendered by him in connection with the Geological Display, Professor Lesley said: "Mr. John H. Harden was the real exhibitor, and devoted an immense amount of time, labor and thought in behalf both of the University and the Survey, and without him, zealously interested in the case, I am convinced that no such exhibition would have been possible. Mr. Harden has received no remuneration for his services and time; more than that he expended $44.54 at the beginning, and $25 at the close in obeying the orders to vacate the premises. I enclose his account for examination and settlement, if it be not too late, and I trust that you have sufficient funds in your hands, not only to reimburse these expenses, but also to grant some remuneration for his services and time, a blank being left at the close of his account."

After consultation, the blank in Mr. Harden's bill was filled with an entry of $75, as an allowance for his time and services in making plans for the disposal of exhibiting space; having the same approved by Professor Pearse and the Centennial authorities; adjusting the collective exhibit in place; and removing it at the close of the Exposition. On the 17th March last, the entire bill, amounting to one hundred and forty-four dollars and fifty-four cents ($144.54) was laid before a Joint Meeting of the Board and Advisory Committee, when, being considered just and reasonable, it was approved and afterwards certified to the Auditor General.

Cost and Characteristics of the Geological Survey's Display.

The allowance of this claim, with the seven hundred and seventy-seven dollars and thirty-six cents ($777.36) previously reported in this connection, makes the entire cost of the Geological Survey Exhibit, nine hundred and twenty-one dollars and ninety cents ($921.90), which is seventy-eight dollars and ten cents ($78.10) less than the appropriation of one thousand dollars ($1,000) originally set apart for that purpose.

The Board have already briefly noticed the Geological Exhibit in their Preliminary Report.* Complete details, including a plan of space, etc., have since been received from Mr. Harden, and the subject has accordingly been treated at greater length in the Descriptive References † which accompany the present report. It is conceded that in extent and variety the display did not rank with those from several of the States, which, through liberal and timely legislative appropriations, were enabled to make and arrange their collections of minerals and archaeological specimens long before the opening of the Exposition. But, as will be seen by reference to the description, the Pennsylvania Geological Display, although small, was unique, and it is alike creditable to its projectors and to the State that the Topographical Maps, Geological Models, and Collection of Minerals which it presented were awarded the highest premium which the Judges could bestow.

Disposition made of Cases and Fixtures.

At the close of the Exhibition, the cases and fixtures used for the Geological Display were removed to the University. They will prove highly useful to the Survey as a receptacle for its collections, and at the request of Professor Lesley, communicated through Mr. Harden, their permanent retention for that purpose has been authorized by the Board.

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* See Preliminary Report, pp. 51-52.

† See Descriptive References, Vol. II, pp. 440-441.

PENNSYLVANIA EXHIBITORS AND EXHIBITS.

The following summary shows the number of Exhibitors from Philadelphia, the number from other parts of the State, and the total number from the Commonwealth, together with the manner of their distribution in the various Departments, the number of Awards made on their Exhibits, and the number of their Exhibits as shown by the classes in which they were grouped:

SUMMARY.

Pennsylvania Exhibitors from Philadelphia	2,366
Pennsylvania Exhibitors from other parts of the State	811
Total number of Pennsylvania Exhibitors	3.177
Distributed in the Departments as follows:	
In Department I—Mining and Metallurgy	181
In Department II—Manufactures	820
In Department III—Education and Science	335
In Department IV—Art	247
In Department V—Machinery	495
In Department VI—Agriculture	1,022
In Department VII—Horticulture	77
Total number of Pennsylvania Exhibitors	3,177
Number of Awards made to Pennsylvania Exhibits	1,617
Number of Pennsylvania Exhibits, as shown by the classes in which they were grouped	3,535

It would be impossible to make even an approximate estimate of the number of distinct objects embraced in these groups. As the facts and figures relating to Pennsylvania Exhibitors and Exhibits are fully set forth and explained in the Catalogue and the Introduction thereto, the Management need only say that the showing is altogether creditable both to Philadelphia and to the State.

THE STATE CENTENNIAL FUND.

The following statement shows the condition of the Books of the Treasurer of the Board, on the first day of November, 1877:

Amount of Appropriation		$40,000.00
SUMMARY OF EXPENDITURES:		
Agricultural Bureau, for live stock display	$50.00	
Architect, plans, specifications, superintendence, etc	838.75	
Building, additions and repairs	17,692.75	
Carpets, Matting, etc	838.48	
Coal	28.00	
Expressage and Freights	35.50	
Flags and Decorations	344.25	
Furniture	1,502.27	
Gas	101.27	
Gas Fixtures	628.42	
Geological Survey, for collective display	921.90	
Carried forward	$22,981.59	

Brought forward	$22,981.59	$40,000.00
Ice	54.82	
Insurance on Building and Furniture	238.00	
Ornamenting Grounds	500.00	
Postage Stamps	179.81	
Salaries	7,863.00	
Stationery, including Printing	753.97	
Stoves and Fixtures	117.20	
Telegrams	50.77	
Washing, Ironing, Blacking, and other incidentals	111.66	
		32,850.82
Balance unexpended		$7,149.18

There are no outstanding items known to the Board, except the Secretary's salary since November 1st, a bill of stationery, etc., not yet rendered, and the expenses incident to the preparation, printing, electrotyping, binding, and distribution of this compilation. As soon as these items shall have been definitely ascertained, the accounts of the Management will be closed, and a statement in detail filed in the office of the Auditor General.

It must be stated in this connection, that, on the 26th August, 1876, Messrs. Kline & Brother, of Philadelphia, rendered a bill of $80.68, for plumbing, etc., done at the State Building, by direction of the Management. This claim was duly certified to and allowed by the Auditor General, and was included in the warrants drawn by him in favor of the Board. Payment of the claim was suspended, however, because it had been discovered that Messrs. Kline & Brother, who had originally been employed as plumbers by the contractors for the erection of the State Building, had omitted to make an important connection in the gas-pipes. To remedy this defect, Messrs. Goetz & Co., of Philadelphia, charged fifteen dollars, which sum was included in their bill, rendered September 29, 1876, for $61.64, and which was also certified to the Auditor General and embraced in his warrants issued to the Board. As the contractors laid the entire responsibility of the incomplete work upon Messrs. Kline & Brother, the latter finally consented to accept payment of their bill with the proper reduction. The sum so deducted, namely, fifteen dollars ($15), remains in the Secretary's hands, and will be covered into the State Treasury on the final settlement of the accounts of the Board.

DISPOSITION TO BE MADE OF BOOKS, PAPERS, ETC.

The Secretary of the Board has in his keeping the following records and documents, viz.:

1. Minutes of the Board of Managers.
2. Minutes of the Board and Associated Committees.
3. Treasurer's Statement.
4. Register of Visitors, May 24, to August 18, 1876.
5. Register of Visitors, August 19, to September 27, 1876.
6. Register of Visitors, September 28, to October 18, 1876.
7. Register of Visitors, October 18, to November 10, 1876.

8. Contract for the erection of the State Building.
9. Policies of Insurance, issued on the Building and Furniture.
10. Duplicates of Vouchers for Expenditures.
11. Letters and Circulars.

These books and papers, with a copy of the Preliminary Report of the Board of Managers in pamphlet form, and a copy of the Final Report and accompanying documents as now presented, will be carefully boxed and labelled, and, unless the Legislature shall otherwise direct, will, with the consent of the proper officials, be deposited in the Bureau of Statistics, at Harrisburg, for safe-keeping. They may seem of little moment now, but the fact that, at some future time, a great interest will inevitably be attached to them as memorials of the Centennial, strongly suggests the importance and propriety of their careful preservation.

The electrotype plates of this work are being packed in strong boxes, and carefully stored to guard against the possibility of their destruction by fire. They are, of course, subject to the direction and control of the Legislature.

Conclusion.

The Board cannot close this report without adverting briefly to the pleasant and cordial relations which have existed throughout between themselves and the members of the Associated Committees. These gentlemen, like those of the Board, have cheerfully borne their own expenses, and have devoted much valuable time in furthering the purposes of their appointment. And now, as the final record is being made up, each and every one connected with the Management may rightfully and proudly cast a retrospective glance at the part which he has taken in the work—a work conducted without lavish or useless expenditure, and at first under great discouragements—but which, now that it has been accomplished, is believed to be the embodiment of all that was possible, under the circumstances, to promote the interests of Pennsylvania and her people at the Centennial Exposition, and to achieve the glorious representation which they made before the assembled Nations of the Earth.

By order of the Board,

A. C. MULLIN,
Secretary.

POST 58, G. A. R.

THE CENTENNIAL EXPOSITION.

THE CENTENNIAL EXPOSITION.

ITS ORIGIN AND HISTORY.

Preliminary remarks.

The commemoration, by appropriate public ceremonies, of eventful periods in the history of the Federal Union and of the several States has ever been a distinguishing characteristic of the American people. It was natural, therefore, that, as the first century of the Nation's existence neared its close, a patriotic desire should everywhere manifest itself to mark that epoch in the advance of liberty and civilization by a celebration which would in every respect be worthy of its grandeur and importance. Specific propositions, as well as numberless vague suggestions, were offered and considered in regard to the subject, and almost a decade in advance of the occasion, the true method of its observance had begun to assume a definite form.

The first suggestion of the scheme.

The idea that the Centennial Anniversary of American Independence might be most fitly commemorated by an Exhibition of the Arts and Industries of the Nation, with an invitation to all the peoples of the world to bring hither their handiwork and products, and join in friendly competition, was a noble conception, the honor attached to which has been variously claimed and ascribed. But when the object, character, and locale of the Exhibition are considered in connection with the time it was first proposed, no one would seem so well entitled to the credit of originating the subsequently-accomplished scheme as Mr. John L. Campbell, of Wabash College, Indiana.

Important correspondence between Prof. Campbell and Hon. Morton McMichael.

As early as December, 1866, Professor Campbell addressed a communication to the Honorable Morton McMichael, then Mayor of Philadelphia, suggesting the holding of an International Exhibition in 1876, as the most suitable means of observing the completion of the first century of the National existence, and presenting many reasons why the celebration should take place in Philadelphia. Whilst cordially endorsing the proposition, Mayor McMichael regarded immediate action on it as premature, foreseeing that, although the sentiment of the country would unitedly assert itself in favor of the Exhibition, yet an appreciation of the immense benefits naturally flowing from such an enterprise, not only to the cause of popular instruction and entertainment, but to their own commercial prosperity, would lead other municipalities to claim the location for themselves, and thus precipitate a rivalry which, as it might embarrass rather than promote the main purpose, ought to be postponed until the last moment consistent with the time which would really be required to determine the site and to prepare the details necessary to the Exhibition. Professor CAMPBELL was, nevertheless, assured of the hearty sympathy and co-operation, not only of Mayor McMICHAEL, but of other prominent officials and citizens of this City and State, and it was promised that, at the proper time, active measures would be taken to secure the accomplishment of his proposition.

The time for action.

In November, 1868, Professor CAMPBELL addressed a second communication to Mayor McMICHAEL, urging immediate action, and to this received a reply concurring in the opinion that the time had arrived when active efforts should be employed to carry out the suggestions which had been previously submitted and considered.

Agitation of the subject.

The subject was agitated by the newspaper press and through public assemblages, and on the 20th January, 1870, the lamented JOHN L. SHOEMAKER, Esq.,* a member of the Select Council of Philadelphia, introduced resolutions, which were unanimously adopted both in that body and in the Common Branch, endorsing the proposition to hold an International Exhibition at Philadelphia, in the year 1876. The movement thus inaugurated was promptly seconded by the Franklin Institute and by the Legislature of Pennsylvania, each of which bodies appointed a Committee to act in conjunction with a similar Committee of City Councils in preparing a memorial to Congress, requesting the necessary legislation to give the enterprise an International character. The memorial agreed upon is so patriotic in its tone, and sets forth so clearly the propriety of holding the Centennial Exposition, with Philadelphia as its seat, that, in justice to the framers of the document, and as the basis of Congressional action, it is reproduced here entire:

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* This gentleman was born in Montgomery County, October 7, 1832. His father was Jesse Shoemaker, a successful and highly respected farmer, whose ancestry dated back to Peter Shoemaker, a friend and associate of Wm. Penn. The earlier years of John L. Shoemaker were spent on his father's farm, during which time he attended such schools as the neighborhood afforded. At the age of eighteen, he left home to finish his education under private tutors. Though he lacked the advantages of collegiate instruction, yet his naturally quick and intuitive mind, and his zeal in the pursuit of useful knowledge, soon fitted him for a high sphere in active life. In 1853 he came to Philadelphia, and entered the office of Charles M. Wagner, Esq., as a student at law. He also attended the Law Department of the University of Pennsylvania, and graduated with honor from that institution in July, 1856, and was soon afterwards admitted to practice in the several city courts, and in March, 1858, to membership at the bar of the Supreme Court of Pennsylvania. In the fall of 1861 he was nominated and returned as a Republican member of Common Council, but a personal examination of alleged irregularities in the army vote made him hesitate to accept an office to which he did not feel himself clearly entitled, and at the first meeting of Councils in 1862, he sent in a letter of declination which was alike creditable to his head and heart. In 1863 he accepted a high position in the Provost Marshal's department and remained in it until the close of the war, meanwhile sending at his own expense a substitute to represent him in the field, although he was not himself liable to military duty. In October, 1866, he was elected to Common Council from the Thirteenth Ward, and took his seat, January 1, 1867. He was re-elected the following year, and in June, 1868, resigned his position, the resignation to take effect on the 1st January, 1870, when one year of his second term was yet to run. In October, 1869, he was elected to represent his ward in Select Council; he was re-elected in 1872, and again in 1875, and was thus a member of Select Council at the time of his death on the 26th December, 1876.

Mr. Shoemaker's prominent connection with the Centennial Exhibition is well known, but many have probably forgotten that it was he who took the first practical step towards its inauguration by introducing the resolutions mentioned in the text. On the 25th May, 1872, he was elected by acclamation Counsellor and Solicitor of the Commission, which position he held until the 18th May, 1876, when, at the annual election of officers, he was defeated, the vote standing 23 for George W. Biddle, Esq., and 20 for Mr. Shoemaker. Mr. Biddle, it appears, had not been an applicant, and it has been alleged that the result sprang from some dissatisfaction on the part of the radicals with Mr. Shoemaker on account of his liberal views on the Sunday-opening question. Mr. Biddle promptly declined acceptance, however, and Mr. Shoemaker, on the 20th May—two days after his defeat—was unanimously chosen by the Commission to fill his old position. The sensitive nature of Mr. Shoemaker made him hesitate to accept under the circumstances, but at the earnest solicitation of those most interested in the success of the Exhibition, he resumed his former labors and continued in the discharge of them until death ended his earthly career. Mr. Shoemaker was ill only about two weeks, his disease being typhoid pneumonia. As a public official, a private citizen, in the domestic circle, indeed in all the relations of life, he performed his part faithfully and well, and his untimely demise was a source of universal regret.

Action of Philadelphia Councils.

Co-operation of State Legislature and Franklin Institute.

MEMORIAL.

Memorial to Congress

To the Honorable the Senate and the House of Representatives of the United States:

The *Declaration of Independence* having been written and signed by its patriotic authors in *Philadelphia*, and its promulgation to the world first made in that city, and as the *Centennial Anniversary* of that memorable and decisive epoch in our country's history is nearly approaching, it behooves the *People of the United States* to prepare for its celebration by such demonstrations and appropriate ceremonies as may become a nation so rapidly risen from struggling infancy to a position of power and prosperity, as at once to command the respect of all Governments and the admiration of the world.

In order, therefore, to stimulate a pilgrimage to the Mecca of American Nationality, the Home of American Independence, on an occasion so worthy of commemoration, it has been wisely suggested that prominent among the features for celebrating our One Hundredth Anniversary there should be an International Exhibition of Arts, Manufactures, and Products of the Soil and Mine, as thereby we may illustrate the unparalleled advancement in science and art, and all the various appliances of human ingenuity for the refinement and comfort of man, in contrast with the meagre achievements of a century past.

For the fulfillment of this, where so fitting a spot as the cradle of our country's liberty, or when the time as on the Centennial Anniversary of the year her freedom had its birth?

In furtherance of an undertaking truly national in its character and so commendable in spirit, the Councils of the City of Philadelphia, the Board of Managers of the Franklin Institute, and the Legislature of the Commonwealth of Pennsylvania have each appointed committees, who, clothed with authority to act from the bodies they represent, respectfully solicit Congress by its action to recognize the fact that the City of Philadelphia is, and of right should be, the place to hold, and that the year one thousand eight hundred and seventy-six would be the time to inaugurate, an Exhibition of the Industry of all Nations.

When such action as your wisdom may deem proper shall have been taken in order to place the grand design under your fostering care and control, it is hoped the President of the United States will be authorized, in due time, to invite the participation of all Governments.

Respectfully submitted.

Committee of the Select and Common Councils of Philadelphia.

A. H. Franciscus,
Wm. Bumm,
Geo. W. Plumly,
Daniel P. Ray,
J. C. Gilbert, M. D.,
E. A. Shallcross,
Samuel G. King,
Geo. H. Smith,
Geo. J. Hetzell,
Thos. A. Barlow,
John Cochran,
R. W. Shields,
G. W. Nickels,
A. Kline,
Geo. W. Hall,

Jno. J. Hargadon,
Louis Wagner,
Pres. Common Council.
Samuel W. Cattell,
Pres. Select Council.
Daniel M. Fox, *Mayor.*
Jno. Bardsley,
J. L. Shoemaker,
Chairman.

Committee of Franklin Institute.

Frederick Fraley,
Enoch Lewis,
B. H. Moore,
J. Vaughn Merrick,
William Sellers, *Chairman.*

Committee of the Legislature of Pennsylvania.

A. Wilson Henszey,
Arthur G. Olmsted,
Charles R. Buckalew,
Charles H. Stinson,
Speaker of the Senate.
Alexander Adaire,
T. B. Schnatterly,
R. Johnson, *Chairman,*
Butler B. Strang,
Speaker of the House.

John L. Shoemaker, *Chairman of Joint Committees.*

Attest, Benjamin H. Haines, *Clerk of Select Council of Phila., and of the Joint Committees.*
Philadelphia, February 24th, 1870.

Bill introduced by Mr. Morrell.

Opposition to the measure in the House.

Claims of rival localities.

Philadelphia's claims preeminent.

Passage of the bill by the House.

This memorial was duly presented to Congress, and on the 9th March, 1870, Hon. Daniel J. Morrell, then representing the XVIIth District of Pennsylvania and holding the Chairmanship of the House Committee on Manufactures, introduced a bill in that body to effectuate the purposes of the petitioners. As had been anticipated, the measure evoked the opposition of some of the representatives and people of other States—an opposition, however, which was directed not so much against the project of the Exposition itself as against the place suggested for holding it. Various localities at once sought to lay the venue in their own interest, and as rivals of Philadelphia, they freely asserted in their own behalf—sometimes separately, at other times unitedly—more worthy historic associations, greater eligibility in geographical position, superior facilities for transportation, and better capacity to entertain the multitudes which the Exhibition would naturally bring together. Unquestionably in all these respects, as in all others, the claims of Philadelphia were paramount; yet to reconcile the various conflicting interests which had been developed, and which for a time threatened to interpose a permanent barrier to the success of the main principle involved in the bill, required great prudence and the exercise of a wise statesmanship. But Mr. Morrell, who had from the very inception of the enterprise entered into its support with all the well-known energy and enthusiasm of his nature, proved equal to the emergency, and both in his official and personal capacity, by his voice and by his pen, did much to conciliate the opposition to his cherished scheme. Thanks to his skillful leadership and untiring efforts, sustained by a united delegation from Pennsylvania and by friends of the measure from other States, the House passed the bill on the 10th day of January, 1871.* Although this action was delayed over ten months, yet, when at last it was secured, the friends of the measure had reason to congratulate themselves. A primary and an essential step in the road to success had been taken.

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*Vote not given, there having been no division asked. Amongst those who took part in the discussion, the following may be named: December, 1870, Mr. Morrell and Mr. Myers, of Pennsylvania, in favor of the bill, and Mr. Cleveland, of New Jersey, against it. January 4, 1871, Mr. O'Neill, of Pennsylvania, for, and Mr. Brooks, of New York, and Mr. Sargent, of California, against it. January 10, 1871, Mr. Kelly, of Pennsylvania, for, and Mr. Wells, of Missouri, against it.

Opposed in the Senate.

In the Senate the bill was also opposed, Mr. SUMNER especially waging war against it, as he did on subsequent occasions when Congressional legislation was asked in aid of the Centennial.* But the measure was ably championed in that body by Senators CAMERON and SCOTT, who, aided by the powerful co-operation of several Senators from other States who had early enlisted in its support, secured its passage in the Senate on the 25th February, 1871, but with an amendment providing that "the United States shall not be liable for any expenses attending such Exhibition, or by reason of the same."†

Passed Senate with amendment.

To the real friends of the bill, this amendment was an unseemly and unwelcome feature, but, as it could not be construed to limit the action of Congress at subsequent sessions when a more generous spirit might be evinced, it was decided to accept it. The hostile feeling which prevailed at the time, and the events which afterwards transpired, showed conclusively that this acquiescence was wise, as, without it, the project of an International Exposition would in all probability have been defeated altogether.

Amendment concurred in by the House.

The amended bill was concurred in by the House on the 28th February, 1871. It was reported enrolled March 1st, and two days later, namely, March 3, 1871, it was approved by the President and became a law.

Approval.

THE UNITED STATES CENTENNIAL COMMISSION.

Organic law.

The Act which sanctioned the praiseworthy scheme of the memorialists and recognized the just claims of Philadelphia to become the seat of the Exposition, was entitled "An Act to provide for celebrating the

Title.

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*It is due to the memory of this distingushed statesman to say that his opposition seems to have been based mainly on the assumption that Great Britain would be piqued by an invitation to participate in the celebration of the anniversary of the decisive event which separated the two countries. Herein he was mistaken. Of all the foreign powers represented at the Exhibition, none apparently entered into the celebration with a more hearty and generous spirit than did the Mother country. She seemed to take an especial pleasure in placing her rich products and excellent systems on the competitive lists with those of her once revolutionary, but since independent, prosperous, and friendly offspring. She did more: she sent hither a Commission, selected from the flower of her people—gentlemen of high official and social standing, of culture and refinement, and of ripe experience and broad views, who did much during their stay to strengthen the bond of sympathy which should ever be maintained between the two nations.

†In the Senate, January 12, 1871, on motion of Mr. Scott, of Pennsylvania, the bill was referred to the Committee on Foreign Relations, by a vote of 35 ayes, no nays. February 7, 1871, Mr. Cameron reported it, as amended, from that Committee. February 16th, on Mr. Cameron's motion, it was taken up and read. February 21st, on motion of Mr. Cameron, it was ordered that the bill should be considered on the 22d February. On that day, Mr. Cameron spoke in its favor, and Mr. Conkling, of New York, against it. February 23d, Mr. Conkling again spoke against it, and Mr. Bayard, of Delaware, and Mr. Scott, of Pennsylvania, in favor of it. Mr. Cameron was very active in the discussion, and Mr. Scott's speech was a powerful argument and appeal in behalf of the measure. In no case were the yeas and nays required on the final passage of the bill either in the Senate or in the House.

The Centennial Commission created.

Its powers.

Commissioners, how appointed.

One Hundredth Anniversary of American Independence by holding an International Exhibition of Arts, Manufactures, and Products of the Soil and Mine, in the City of Philadelphia, and State of Pennsylvania, in the year eighteen hundred and seventy-six." The Act provided, amongst other things, that a Commission, to consist of not more than one delegate (with one alternate) from each State and Territory of the United States, whose functions should continue until the close of the Exhibition, should be constituted, whose duty it should be to prepare and superintend the execution of a plan for holding the Exhibition; and, after conference with the authorities of Philadelphia, to fix upon a suitable site within its corporate limits where the Exhibition should be held—the Commissioners and Alternates to be appointed within one year from the passage of the Act, by the President of the United States, on the nomination of the Governors of the States and Territories respectively. These nominations and appointments were made in due time.

First meeting of the Commission.

The Select and Common Councils of Philadelphia having passed an Ordinance, which was approved by the Mayor October 30, 1871, entitled "An Ordinance to provide for the first meeting and organization of the United States Centennial Commission, and to make an appropriation therefor," an informal meeting of the Commissioners was held at the Continental Hotel, March 4, 1872, twenty-six States and Territories being represented as follows:

Members present at first meeting.

Joseph R. Hawley, Connecticut; William M. Byrd, Alabama; Lewis Waln Smith (Alternate), Georgia; James E. Dexter, District of Columbia; John L. Campbell, Indiana; Robert Lowry, Iowa; John Lynch, Louisiana; George Alex. Batchelder, Dakota; Joshua Nye, Maine; James Birney, Michigan; John Dunbar Creigh, California; Orestes Cleveland, New Jersey; Charles H. Marshall (Alternate), New York; Henry Probasco, Ohio; Daniel J. Morrell, Pennsylvania; George H. Corliss, Rhode Island; William F. Prosser (Alternate), Tennessee; William Henry Parsons, Texas; John H. Wickizer, Utah; John N. Baxter, Vermont; Walter W. Wood, Virginia; Andrew J. Sweeney (Alternate), West Virginia; David Atwood, Wisconsin; Robert H. Lamborn (Alternate), Wyoming; Henry S. Moody, Nebraska; William P. Blake (Alternate), Connecticut; Solomon L. Spink (Alternate), Dakota; J. Marshall Paul, Colorado; David M. Boyd, Jr. (Alternate), Indiana.*

Temporary organization.

A temporary organization was effected by appointing Mr. Atwood, of Wisconsin, President, and Mr. Baxter, of Vermont, Secretary. In accepting his position, the President made a brief address, after which the Commissioners proceeded in a body to Independence Hall, in accordance with an invitation extended to them by the Mayor and City Councils.

Proceedings at Independence Hall.

On entering the Hall, Mr. John L. Shoemaker, Chairman of the Centennial Committee of Councils, presented the Commissioners to his

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*During the subsequent session of the Commission, other Commissioners and Alternates presented their credentials and were admitted to seats.

So many changes occurred in the Commission from time to time, through death, resignation, and other causes, that it is proposed in this compilation to give only the list of Commissioners certified by the State Department at Washington, in March, 1872, and the list reported to the Commission by Mr. Secretary Campbell, in May, 1876. They will be found in Vol. II, Appendix D, pp. 41-42.

Honor Mayor Stokley, who made an address of welcome, to which General Hawley responded on behalf of the Commission. Illness preventing the presence of his Excellency Governor Geary on the occasion, a communication from him to Mr. Shoemaker was read in explanation. After a few minutes indulged in by a formal introduction of the members of Councils, the Commissioners were escorted to the Chamber of Common Council, where, through President Littleton of the Select, and President Wagner of the Common Council, the use of the Chambers was formally tendered to the Commissioners, and was accepted by them for such length of time as they might desire for the transaction of their business.

Use of Council Chambers accepted by the Commission.

The Mayor and Councils having retired, President Atwood called the body to order, and introduced Rev. Dr. Hutter, of Philadelphia, who opened the proceedings with prayer. Committees on Credentials, on Permanent Organization, and on By-Laws, were then appointed, and the Commission adjourned until the following day.

Prayer.

Committees on permanent organization, By-laws, etc.

The proceedings on March 5th were chiefly confined to the presentation and adoption of a report from the Committee on Credentials, which contained, amongst other things, a recommendation that Alternates be invited to take seats in the Commission, but not to participate in the proceedings, unless in the absence of the Commissioners.

Adoption of report on Credentials.

Alternate Commissioners.

On the following day, March 6, 1872, By-Laws for the government of the Commission, were reported and adopted; after which the Committee on Permanent Organization named the following gentlemen to serve as officers of the Commission: *President*—Joseph R. Hawley, Connecticut. *Vice-Presidents*—Orestes Cleveland, New Jersey; Henry Probasco, Ohio; William M. Byrd, Alabama; John Dunbar Creigh, California; Robert Lowry, Iowa. *Temporary Secretary*—Lewis Waln Smith,* Georgia.

Adoption of By-laws.

Report on permanent officers.

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* This gentleman—the Alternate Commissioner of Georgia—is a well known and highly esteemed citizen of Philadelphia. His assistants in the discharge of his duties as Temporary Secretary were Colonel Myer Asch and Mr. Benjamin H. Haines, to whom, through an official communication made to the Commission, December 4, 1872, he paid the compliment that they had "discharged all the duties of their office with great fidelity and with entire satisfaction." On several occasions Mr. Smith asked to be relieved from his labors as Temporary Secretary on account of professional engagements, but, in deference to the repeatedly expressed desire of the Commission, he remained in service until the office was made permanent, when he was succeeded by Professor John L. Campbell, the Commissioner from Indiana. When entering upon his new duties, May 12, 1873, Mr. Campbell offered the following resolution, which was unanimously adopted by the Commission: "*Resolved*, That the thanks of this Commission are hereby tendered to the Hon. Lewis Waln Smith for the invaluable services gratuitously performed by him, as Temporary Secretary, since the organization, March 4, 1872, to the present time. The ability and zeal he has manifested command our highest commendation, and we desire to place upon record our cordial endorsement of his acts as Secretary of the Commission."

Col. Asch has remained Assistant Secretary of the Commission ever since. Mr. Haines was subsequently appointed Secretary of the Executive Committee, but was succeeded in that office by Col. Asch, June 1, 1874. The latter gentleman was also associated with the Director General in the direction of the foreign representation. The duties pertaining to these three positions have been varied, onerous, and sometimes delicate and perplexing, but the education and training of Col. Asch—his ripe experience in business affairs, his knowledge of diplomacy, his indomitable energy, obliging nature and thorough politeness—have enabled him throughout to discharge his responsible trusts with great acceptance to all concerned. Mr. Dorsey Gardner, also an Assistant Secretary of the Commission, has proved the worthy associate of Col. Asch, and by his ability, zeal, and untiring labors has contributed largely in advancing the interests of the Exhibition and in popularizing the management of its affairs.

Report adopted.

The report of the Committee on Permanent Organization was unanimously agreed to, and in accepting their positions, Messrs. HAWLEY and SMITH made appropriate addresses. On the next day, the appointment of an Executive Committee of seven, was announced by the Chair and immediately confirmed by the Commission, to wit:

Executive Committee appointed

Executive Committee.—DANIEL J. MORRELL, Johnstown, Pa.; JOHN V. L. PRUYN, Albany, N. Y.; GEORGE H. CORLISS, Providence, R. I.; WILLIAM PRESCOTT SMITH, Baltimore, Md.; JOHN LYNCH, New Orleans, La.; JOHN G. STEVENS, Trenton, N. J.; WALTER W. WOOD, Virginia.

Other Committees were constituted as follows:

Other Committees.

Committee on Tariffs and Transportation.—O. C. FRENCH, Jackson, Mississippi; DAVID M. BOYD, Jr., Indiana; CHARLES H. MARSHALL, New York City; JOSHUA NYE, Augusta, Maine; ANDREW J. SWEENEY, Wheeling, West Va.; WILLIAM F. PROSSER, Nashville, Tenn.; JOHN H. WICKIZER, Salt Lake City, Utah.

Committee on Finance.—J. WILEY EDMANDS, Boston, Mass.; ASA PACKER, Mauch Chunk, Pa.; SAMUEL POWEL, Newport, R. I.; JAMES BIRNEY, Bay City, Mich.; J. MARSHALL PAUL, Fair Play, Colorado.

Committee on Plans and Architecture.—HENRY PROBASCO, Cincinnati, Ohio; WILLIAM HENRY PARSONS, Houston, Texas; JOHN N. BAXTER, Rutland, Vt.; E. A. STRAW, Manchester, N. H.; DAVID ATWOOD, Madison, Wis.; WILLIAM T. READ, Delaware; GEORGE A. BATCHELDER, Dakota.

Committee on Opening Services.—JAMES L. ORR, South Carolina; RICHARD C. McCORMICK, Arizona; HENRY S. MOODY, Nebraska; SAMUEL POWEL, Newport, R. I.; WILSON W. GRIFFITH, Ohio.

Committee on Foreign Affairs.—JOHN L. CAMPBELL, Indiana; JOHN G. STEVENS, New Jersey; ROBERT H. LAMBORN, Wyoming; JOHN V. L. PRUYN, New York; LEWIS WALN SMITH, Georgia.

Committee on Legislation. — DAVID ATWOOD, Wisconsin; ORESTES CLEVELAND, New Jersey; WILLIAM M. BYRD, Selma, Alabama; WILLIAM F. PROSSER, Nashville, Tenn.; JAMES E. DEXTER, Washington, D. C.; SOLOMON L. SPINK, Dakota; WM. H. CLAGETT, Montana.

Permanent organization complete.

All the Committees authorized by the By-laws having been appointed, the permanent organization of the United States Centennial Commission, under the organic Act, was thus complete.

Proceedings of the Commission during 1872.

Three distinct sessions of the Commission were held during the year 1872—in March, May, and December. The site of the Exhibition was definitely fixed, arrangements were made for the preparation and reception of plans and estimates for the necessary buildings, addresses were freely disseminated through the newspaper press and by circulars with a view to enlist the encouragement and support of the people, measures were adopted to secure the active co-operation of the authorities of States and Territories, foreign representation was invited and urged, and every possible preliminary step taken by the Commission which seemed calculated to promote the success of the Exhibition.

THE CENTENNIAL BOARD OF FINANCE.

Necessity for its Creation.

As the law which gave the Commission existence expressly provided that "no compensation for services shall be paid to the Commissioners or other officers provided by this act from the Treasury of the United States; and the United States shall not be liable for any expenses attending such Exhibition, or by reason of the same," it will readily be seen that the early labors of the Commission were prosecuted under disadvantageous and even trying circumstances. The Commission, although appointed and organized, had not been invested with corporate powers and privileges. The proper method of raising the requisite funds for the accomplishment of the great object which it had in charge, became, therefore, a question of grave moment. The high character of the gentlemen connected with the Commission might indeed have enabled them to obtain ample material aid through a pledge of the receipts of the Exhibition; but when that idea was suggested, it was promptly dismissed as comporting better with the project of a private speculation than a grand International enterprise, in which, under proper limitations, all who desired should be permitted to share.

Obstacles to the success of the Commission.

As best showing the action of the Commission in this emergency, the following is quoted from a report of the Executive Committee, presented by its Chairman, Mr. MORRELL, May 23, 1872, and immediately adopted by the Commission:

Report of the Executive Committee.

"The deliberations of your Committee have been mainly directed to questions of providing funds adequate to the erection of buildings suited to the needs of the Exhibition, and the expenses of its preparation and management. After full discussion it was decided that the Commission, as such, should not now ask for National or State appropriations for the purpose, and should not have any financial trust in connection with this Department of the Exhibition.

"To give the people of the whole country equal opportunity to contribute funds for Centennial purposes, place the enterprise upon a fair business footing, and to enable those who furnish the means to have a voice in the management, with a share of the risks and profits, it was concluded to apply to Congress for the charter of a corporation to be called the 'Centennial Board of Finance,' which should have power, under the direction of the Centennial Commission, to raise ten millions of dollars upon the sale of stock, and upon which corporation should be devolved all the duties and powers necessary to conduct the work to a successful issue. In accordance with this determination, the form of an Act was prepared and submitted to Congress, and such measures taken as were deemed best to secure early and favorable action thereon. * * * It was at first proposed that the National Commissioners should be named as corporators, but this idea was abandoned after mature reflection, as it would have been a virtual abdication on the part of the Commissioners of their functions as representatives of the United States for membership in a corporation, in the management of which they could have influence only in proportion to the amount of their stock. This would have been a detriment to the country, and also to the proposed celebration and exhibition, which would have lost the prestige conferred upon it by the National endorsement and control through the United States Commissioners.

Creation of Board of Finance suggested.

Act of incorporation prepared and submitted to Congress.

"Instead of making the Commissioners corporators, each member of the Commission was asked to name prominent business men of his State or Territory, of marked purity and intelligence, which names, or so far as they were furnished in time, were inserted in the bill."

Corporators suggested.

On the 29th May, 1872, the Commission adjourned until December 4th of the same year. The enactment of the bill to create the Centen-

Adjournment of Commission.

Congressional delay.

Bill passed.

nial Board of Finance had been urged upon Congress in every proper way, and its passage had been confidently but vainly expected from day to day during the May session of the Commission. Soon after the adjournment of the Commission, however, the bill was enacted as presented, and nearly without alteration, except in the names of the corporators which had been suggested by the Commission.

Title.

Dates of passage and approval.

Corporate powers conferred on the Commission and Board.

Alternates, relative to.

Corporators.

Capital

Votes.

Subscriptions.

Board, how constituted.

Quorum.

Records, etc.

Issue of bonds authorized.

Distribution of assets.

Commission to audit accounts.

And report to the President of the United States.

The Act was entitled "An Act relative to the Centennial International Exhibition, to be held in the City of Philadelphia, State of Pennsylvania, in the year eighteen hundred and seventy-six." It passed the House, May 21, 1872, and the Senate on the 29th of the same month. Two days later it was reported enrolled, and on the 3d day of June it received the Executive approval. Under its provisions the Centennial Board of Finance was created a body corporate, and full corporate powers and privileges were also conferred upon the United States Centennial Commission. It further provided that each Alternate Commissioner should have all the powers of a Commissioner when the Commissioner was not present at any meeting; that when the Commissioner was present, the Alternate might participate in the debates and serve on Committees, but should have no vote. Its other important provisions may be briefly summed up as follows: There were two corporators named for each Congressional District, and four for each State and Territory at large. The authorized capital was ten million dollars, divided into shares of ten dollars each; certificates therefor to be duly issued, and each share to entitle the holder thereof to one vote in person or by proxy. The Centennial Commission was empowered to open books of subscription, and to organize the Board, the Directors of which were to consist of twenty-five Stockholders, to be elected annually by the Stockholders from a list of one hundred of their own number, selected and nominated by the Centennial Commission. Nine members of the Board of Directors were to constitute a quorum, and power was given to adopt By-laws and elect the necessary officers. Upon the organization of the Board of Directors, the Centennial Commission was directed to deliver to it all stock subscription books, with the papers and records of any kind pertaining to the same. The Board was also empowered to issue bonds, not in excess of its capital stock, and secure their payment, principal and interest, by mortgage upon its property and prospective income; and the duty was imposed upon it of converting, as soon as practicable after the close of the Exhibition, its property into cash, and, after the payment of all its liabilities, of dividing its remaining assets among its Stockholders, *pro rata*, in satisfaction and discharge of its capital stock. The Centennial Commission was directed by the same Act to supervise the closing up of the affairs of the Board of Finance, to audit its accounts, and to submit, in a report to the President of the United States, the financial results of the Centennial Exhibition.

Executive Committee to take pre-

During the pendency of this measure in Congress, and before the adjournment of the May session of the Commission, the latter body wisely resolved, that, "upon said Act becoming a law, the Executive Committee is hereby instructed and empowered to prescribe the rules and take all necessary steps for the organization of said Centennial Board of Finance, in accordance with the provisions of said Act."

liminary steps to organize the Board of Finance.

By this judicious and timely action, the Executive Committee had nearly the whole of the vacation between the May and December sessions of the Commission to devote to the important and responsible labor which, in addition to its other duties, had thus been devolved upon it. The subject was one which demanded great care and consideration, and necessitated various meetings of the Committee in Philadelphia and New York. Finding itself embarrassed for want of funds to pay for the printing and distribution of books and blanks relating to the organization of the Board of Finance, and to conduct its other labors, the Executive Committee appealed to the citizens of Philadelphia for aid, which resulted, November 4, 1872, in an appropriation by the municipality of the sum of fifty thousand dollars ($50,000) as a provision for the current expenses of the Commission. This generous sum was voted by Councils with promptness and unanimity, and it was a significant pledge of the interest which Philadelphia took in the success of the Exhibition.

Action of the Executive Committee.

Financial embarrassments.

Appropriation by Philadelphia Councils.

On the 4th December, 1872, the Executive Committee, through its chairman, Mr. MORRELL, made a report (which was immediately adopted by the Commission), prescribing rules for the organization of the Board of Finance, with a tabular statement showing the population of each of the States and Territories, and the amount of stock which they were severally entitled to subscribe under the Act of Congress. With the approval of the Chairman of the Executive Committee, the Executive Commissioner* had distributed these rules, with the table of quotas attached, in all the States and Territories, and had informed each corporator of the Board of Finance of his appointment, requesting him to put himself in communication with the Commission, and to make such suggestions as he might think proper to promote the success of the celebration. Circular letters had been addressed to each Commissioner and Alternate in reference to the opening of the books, and to each corporator of the Board of Finance relative to the appointment of agents for the sale of the stock in the respective States and territories, and blanks had been distributed, enabling persons at a distance to subscribe for stock by mail. Under the direction of the Executive Committee, the books of subscription for stock were opened in the several States and Territories on Thursday, November 21, 1872.

Report of the Executive Committee.

Rules for the organization of the Board.

Apportionment of stock.

Distribution of rules, etc.

Circulars to Commissioners, Alternates, and Corporators of the Board of Finance.

Subscription books opened.

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*The office of Executive Commissioner was constituted May 29th, 1872, and was, on the same day, by the unanimous vote of the Commission, conferred upon Professor William P. Blake, the Alternate Commissioner from Connecticut. His duties and compensation were to be fixed by the Executive Committee, and the tenure of his office to be determined at the pleasure of the Commission. Professor Blake had had considerable experience at former Expositions, and in 1873, he was sent by the Executive Committee to Vienna in the special interest of the United States Centennial Commission. In addition to other important duties, he was principally charged with the preparation of the system of classification, a work involving great care and labor.

Meeting of corporators and stockholders.

President.

Nomination of Directors.

Secretaries.

Judges and Clerks of election.

Vacancies, how filled.

Opening and closing of the polls.

Directors elected.

A meeting of the corporators and others, subscribers for stock of the Board of Finance, was held in Concert Hall, Philadelphia, April 22, 1873, at 12 o'clock, noon, in pursuance of a call issued on the 10th of the preceding month. Hon. JOSEPH R. HAWLEY, President of the Commission, having called the meeting to order and stated its object, Hon. WILLIAM BIGLER was unanimously chosen to preside. On taking the chair, he made an appropriate address. The Secretary of the Commission read the names of one hundred stockholders who had been nominated by that body, and from whom the stockholders were to elect a Board of twenty-five Directors. Messrs. A. R. LITTLE and GEORGE S. FOX were then elected Secretaries of the meeting, and Messrs. JOHN O. JAMES, JAMES LONG, and G. MORRISON COATES were appointed Judges to conduct the election, with Messrs. J. HAYS CARSON and DANIEL SUTTER as Clerks. Before opening the polls, a resolution was adopted, authorizing the Directors to fill vacancies that might occur in their own body during the periods between the meetings of the stockholders of the Board of Finance. The ballots were then prepared and deposited, and the polls closed at two minutes past 4 o'clock, P. M., when, after counting the votes, it appeared that the following named gentlemen had been duly elected *Directors of the Board of Finance* for the term of one year, to wit: Messrs. BENJAMIN F. ALLEN, Iowa; WILLIAM H. APPLETON, New York; JOHN S. BARBOUR, Virginia; CLEMENT M. BIDDLE, Philadelphia; A. D. BULLOCK, Ohio; THOMAS COCHRAN, Philadelphia; CHARLES W. COOPER, Allentown, Pennsylvania; JOHN CUMMINS, Massachusetts; SAMUEL M. FELTON, Philadelphia; EDWIN H. FITLER, Philadelphia; DANIEL M. FOX, Philadelphia; JOHN GORHAM, Rhode Island; A. S. HEWITT, New Jersey; HENRY C. LEA, Philadelphia; WILLIAM V. MCKEAN, Philadelphia; JOSEPH PATTERSON, Philadelphia; ROBERT M. PATTON, Alabama; JAMES M. ROBB, Philadelphia; WILLIAM SELLERS, Philadelphia; N. PARKER SHORTRIDGE, Philadelphia; EDWARD T. STEEL, Philadelphia; J. EDGAR THOMSON, Philadelphia; C. C. WASHBURN, Wisconsin; JOHN WELSH, Philadelphia; and JOSEPH WHARTON, Philadelphia.

Organization.

Officers.

The Directors so elected assembled on the first day of May, 1873, at 12 o'clock, noon, at the rooms of the Centennial Commission, No. 904 Walnut Street, Philadelphia, and organized, in accordance with law, by the election of Mr. JOHN WELSH, of Pennsylvania, *President;* Mr. WILLIAM SELLERS, of Pennsylvania, *First Vice-President;* Mr. WILLIAM H. APPLETON, of New York, *Second Vice-President;* and the appointment of Mr. THOMAS COCHRAN, of Pennsylvania, as *Temporary Secretary.*

The organization reported to the Commission and approved.

On the 7th May, 1873, the Executive Committee, through its chairman, Mr. MORRELL, reported to the Centennial Commission the election of the Directors of the Board of Finance. The Commission immediately accepted the report.

The result.

By the action thus taken and the preliminary steps which led to it, the Centennial Commission divested itself of all financial trusts in connection with the Exhibition, reserving to itself its character as a disinterested and independent board of direction representing the Government and people of the United States.

Character of the Board a guaranty of success.

The organization of the Board of Finance placed the Exposition upon a business footing. Its officers and directors were men of large practical experience and of conceded integrity and ability, enjoying the confidence of the country in that high degree which gave assurance that their labors would be prosecuted with vigor and success.

Committee of Conference.

That there might be no conflict between the two bodies in the exercise of jurisdiction or authority, a Committee of Conference, consisting of Messrs. LEWIS WALN SMITH, JOHN L. SHOEMAKER, THOMAS COCHRAN, and DANIEL M. FOX, was appointed to define the relative rights and duties of the Commission and the Board of Finance. The report of this Committee was made as early as May 3, 1873. The following is an extract therefrom:

Report.

Relative rights and duties of the Commission and Board defined.

> "An examination of the Acts of Congress, approved March 3d, 1871, and June 1st, 1872, discloses the fact that the powers and duties of the two bodies seem somewhat to intermingle, and no doubt will require, in many instances, more consideration to arrive at proper and legal conclusions, than the limited time assigned us to report will permit. Under the circumstances, we are of the opinion that the great essential of success is, that harmony should exist between the two corporations, and that there should, in all matters, be that full and free conference which will promote the common end. So far as the work which lies immediately before us is concerned, and which is apparent on the face of the Act, the Committee have united on the following construction of the Acts:
>
> "1st. That the right to originate and adopt a plan for the buildings belongs to the Commission; but, inasmuch as the Board have to provide the necessary funds for erecting the same, and are charged with their erection, the estimate of the cost of the buildings should be submitted to the Board for approval, before final adoption by the Commission.
>
> "2d. The power to fix and establish entrance and admission fees is vested in the Commission; but, as these are the chief sources of revenue of the Board, this power on the part of the Commission should be carefully exercised, with a due regard to the promotion of the financial success of the enterprise.
>
> "3d. The Board of Finance to submit to the Commission a design for a certificate of stock for approval.
>
> "4th. That the power is vested in the Commission to make all rules affecting the rights or interests of the exhibitors; but, before final adoption, there should be a full consultation with the Board of Finance.
>
> "5th. The awarding of premiums and the appointment of judges and examiners are vested in the Commission; but it is recommended that, before the cost of the premiums be definitely settled, the same shall be made to conform, as nearly as possible, to the views of the Board of Finance.
>
> "The general rule which has governed the Committee, and which they recommend be the one adopted for the future, in determining with whom the duty and power vest, is, that all matters concerning revenue and the expenditure thereof, ought to be primarily under the direction of the Board of Finance, and that all other matters appertaining to the National character or success of the Exhibition, should be within the special control of the Commission. By referring all doubtful points to this rule, and exercising a mutual spirit of harmony, it is believed that any dissension may be avoided."

The report adopted.

This report was promptly adopted, as expressing the duties of the two corporations and the sentiment which should govern their relations.

Conference between the Commission and Board.

On the 8th May, 1873, the two bodies held a conference at the rooms of the Commission, at which a full interchange of opinion was had, and, through numerous addresses, a hearty co-operation assured.

In this spirit of harmony, and determined to achieve success, the Centennial Commission and the Board of Finance, now fully organized, moved forward in the great work before them.

EXECUTIVE AND ADMINISTRATIVE AUTHORITIES.

Executive Committee.

Composed of one Commissioner and one Alternate from each State and Territory, the United States Centennial Commission was a large and rather unwieldy body, whose meetings, had they been frequent or protracted, would necessarily have entailed great inconvenience and expense upon its members. Soon after its organization, therefore, whilst reserving of course a general supervisory control, it wisely and liberally entrusted the exercise of its functions to an Executive Committee. This body was composed originally of seven, and afterwards of thirteen members, who were selected with due regard to their business capacity, energy, and special fitness, and it was throughout under the able chairmanship of the Honorable Daniel J. Morrell. Acting under a deep sense of the grave responsibilities with which it was charged, it displayed at all times promptness, efficiency, and sound judgment in the inauguration and management of the manifold measures relating to the practical working of the Exhibition and intended to promote its success.

Director General.

To aid the Executive Committee in the conduct and management of its affairs, the Commission made the following important addition to its By-laws on the 12th May, 1873:

> "Article VI. The Executive Committee shall have authority to elect one of its own members who shall be known and recognized as Director General, whose office shall be at the headquarters of the Commission in Philadelphia, and whose duties, powers, and compensation shall be fixed by the said Committee."

On the following day, Mr. Morrell reported to the Commission that the Executive Committee had elected Mr. Alfred T. Goshorn, of Ohio, to the office of Director General. The selection was unanimously endorsed by the Commission, and soon afterwards Mr. Goshorn entered upon his new and arduous field of labor. The manner in which he has performed its multifarious and important duties has deservedly won for him the encomiums, not only of our own Government and people, but of those of all the foreign nations which were represented at the Exhibition.

Bureaus of Administration.

In order to ensure the prompt dispatch of all business, it was also found necessary, as the preparations for the Exhibition advanced, to have every branch of the work organized at the office in Philadelphia and thoroughly systematized, with experts at the head of each department. The Executive Committee, therefore, resolved to complete the organization of the central office by constituting administrative bureaus which should discharge their appropriate duties under the supervision of the Director General. These bureaus, with their respective functions and chiefs, were as follows:

Foreign—Direction of the foreign representation: A. T. Goshorn, Myer Asch.

Installation—Classification of applications for space—allotment for space in Main Building—supervision of special structures: Henry Pettit.

Transportation—Foreign transportation for goods and visitors—transportation for goods and visitors in the United States—local transportation—warehousing and customs regulations: Dolphus Torrey.

Machinery—Superintendence of the Machinery Department and building, including allotment of space to Exhibitors: John S. Albert.

Agriculture—Superintendence of the Agricultural Department, building and grounds, including allotment of space to Exhibitors: Burnet Landreth.

Horticulture—Superintendence of Horticultural Department, conservatory and grounds, including allotment of space to Exhibitors: Charles H. Miller.

Fine Arts—Superintendence of the Fine Art Department and building, including allotment of space to Exhibitors: John Sartain.

The gentlemen thus appointed remained on duty throughout the entire Exposition, and they discharged the functions of their respective bureaus with great ability and acceptance.

MAINTENANCE OF ORDER AND SECURITY OF PROPERTY.

To whom entrusted.

The enforcement of good order, and the protection of the grounds and buildings, with their contents, were confided to a corps of Centennial Guards (to which was attached a Detective Force); a staff of Janitors; a body of Firemen; and a force of United States Custom House Officers.

Centennial Guard.

The Centennial Guard consisted originally of 1,176 men, comprising representatives from twenty-five States, the largest number from any one being 608 from Pennsylvania, of whom 197 were from Philadelphia. The following table shows the relative number enrolled for each period of five years from 21 onwards:

Enlistments.

From 21 to 25 years inclusive,	223	men
" 26 to 30 " "	340	"
" 31 to 35 " "	288	"
" 36 to 40 " "	211	"
" 41 to 45 " "	95	"
" 46 to 50 " "	12	"
Over 50 years of age,	7	"
Total,	1,176	men.

Reduction of the force.

Daily average strength.

Companies.

On the 1st July, the members of the Guard numbered 1,053, but the force was reduced, August 1st, to 700 men, and remained at that figure until the close of the Exposition, when further gradual reductions were made as circumstances allowed. The daily average of the force during the entire period of the Exhibition was 802. The men were formed into

Precincts. six companies, each under a captain. There were six precincts to which they were assigned, and the same number of barracks in which they were quartered. Guards required to reside on the grounds. The members of the Guard were required to reside on the Centennial grounds, but were allowed one night in three to visit their families and friends in the city. With this exception, they were always on active duty or on reserve at their quarters. Pay. They were paid two dollars per day for their services, one week's pay being retained as a forfeiture in the event of dismissal for misbehavior. Personnel of the Guards. Most of the men had seen actual service in the armies of the Union or of the Confederacy during the Rebellion, and very readily accommodated themselves to the duties of their new position. Their efficiency. They were at all times polite and obliging towards visitors, but stern and prompt in the enforcement of good order.*

Guards at Main Building. Of the members of the Centennial Guard, two hundred and twenty-six (2 officers and 224 men) were employed during the Exposition in and about the Main Building and its Annexes.

Special (foreign) police. As a further means of security, the Commissioners from England, Germany, France, and some other foreign countries which had suffered from larcenies at former Exhibitions, provided special police forces of their own.

Detective force. The Detective force which was specially employed consisted of How selected. thirty of the most skillful detectives which could be selected from the principal cities of the United States. Their knowledge of the principal pick-pockets. They had full and complete knowledge of the chief pick-pockets of their respective localities, and the latter were not slow to discover the presence of the detectives at the Exposition. Thus, whilst the light-fingered professionalists operated to some extent outside the grounds—on the densely-packed street-cars and crowded thoroughfares of the City—Scarcity of pick-pockets at the Centennial. they seldom entered an appearance within the Centennial enclosure, feeling assured that any attempt to ply their vocation there would almost certainly be followed by detection and punishment.

Command of Centennial Guard and Detectives. The Detective force, as well as the Centennial Guard to which it was attached, was organized by, and was under the command of Col. H. DE B. CLAY,† who, with his Staff, was responsible to the Director General.

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*Mr. Charles Hagen, Inspector of the British Metropolitan Police, in his report to Col. H. B. Sanford, R. A., Executive Commissioner on behalf of Great Britain, pays this elegant compliment to the American people: "One fact, however, must be mentioned, . . . the absolute sobriety and orderly conduct of an American crowd; it will scarcely be credited by English readers, but it is a certain fact that during the whole of the Exhibition, with as many as 256,000 visitors in one day, scarcely a case of drunkenness was seen."

† Col. Clay retired, July 31, 1876, and on the following day, Capt. William A. Hoyt was promoted to Major, after which the command devolved on him, subject to the general control of the Director General and Hon. Thomas Cochran, Chairman of the Committee on Grounds, Plans, and Buildings, Board of Finance.

In addition to his other duties, the Commandant of the Guard had the care and custody of lost persons, and also of lost and stolen goods, when found or recovered. Persons lost on the grounds or in the buildings were, as soon as discovered by the Guards, taken directly to headquarters, and if they had friends in quest of them, they were always instructed to go there first to prosecute their searches. The unfortunates were all safely returned to their homes or friends on the same day they were lost, with a solitary exception—a babe about one year old, which was cared for during the night and restored to its anxious mother the next morning. On Pennsylvania Day, as many as fifty-eight lost children were taken charge of and restored to their parents or friends. Lost or stolen goods were restored to the claimants on satisfactory proof of ownership, such articles as remained at the close of the Exhibition being turned over to the Board of Finance.

Certificates of discharge.

On the 3d November, 1876, the Centennial Commission resolved, "that there be prepared an engraved or handsomely printed certificate of discharge for the members of the Centennial Guard who have served during the Exhibition and have been honorably discharged."

Janitors.
Duties.
Sometimes on duty with the Guard.
Janitors at Main Building.
Officers.

The Staff of Janitors numbered 240 members. They were subject to the orders of the Superintendents of the various Exhibition buildings, who were in turn responsible to the Board of Finance. The duties of the Janitors consisted in sweeping and cleaning the buildings, and in attending to the gas-lights, but they were frequently stationed at the doors in conjunction with Centennial Guards to keep watch on suspicious characters passing in or out. In and about the Main Building and Annexes, the force of Janitors employed consisted of eighty men and four officers, the latter being JAMES A. ABEL, *Chief*, and JOHN B. WHITE, CHARLES ABEL, and ELI NEUNAM, *Assistants*.

Firemen.
How distributed.
Reserves.
Perfection in drill and appliances.
Little damage to goods from fires.

The Firemen, 200 in number, were under the command of Captain SMITH, an agent for the Philadelphia Insurance Companies, and accountable to the Board of Finance. They were distributed in the different sections of the buildings, with reserves at the four different stations on the grounds. The system of drill and the appliances for preventing and extinguishing the destructive element were so admirable, that, although fires and alarms of fires were not infrequent, but little damage was permitted to result therefrom to the goods on exhibition.

Satisfactory results.

Thus, through these several agencies, combined with the vigilance of the United States Custom House Officers, the maintenance of order and the protection of property were secured in a manner which reflected great credit, as well upon the Centennial authorities as upon the men who so faithfully performed the onerous and responsible duties committed to their charge.

AUXILIARY ORGANIZATIONS.

STATE BOARDS.

Co-operation of States and Territories solicited.

Early action was taken by the Centennial Commission to secure the active co-operation of the States and Territories. On the 11th May, 1872, the following resolution was adopted in this connection:

Resolution.

> "*Resolved*, That the Governors of the several States and Territories be requested, through State organizations, to assist and co-operate with the Commissioners appointed by them, in the matter of State legislation, if required; and in every way that may awaken an interest, and tend to promote and bring to the best results the objects of this Commission."

Circulars to Governors.
State Boards recommended.

Again, on the 29th May, 1872, a circular was addressed to each Governor, requesting him to invite the attention of the Legislature to the importance of the proposed celebration, to the end that such legislation might be adopted in each State and Territory as would secure the appointment of a capable body whose influence would tend to develop local interest therein, and thus aid the Commission in its great work. This was followed, January 30, 1875, by an important communication from the

Communication from Director General to Governors.

Collective displays.

Director General, requesting each Governor to urge immediate provision for a collective display of such objects, statistics, and information as it would not be to the interest or within the power of individuals to collect and prepare, but whose presentment would nevertheless be essential in affording a summary view of the history, progress, and resources of his State or Territory.

State Boards, how constituted.

In States and Territories where State Boards had not been constituted, the Director General recommended (August, 1874,) that, in order to secure their organization throughout the country without further delay, they should consist of the Centennial Commissioner and Alternate, and not less than three other persons to be appointed by the Director General with the advice and consent of the Commissioners of the State or Territory. Pennsylvania and some other States provided by local legislation that the Centennial Commissioners and Alternates for such States should respectively be members of their State Boards.

Their duties.

The duties of State Boards were: 1. To disseminate information regarding the Exhibition. 2. To secure the co-operation of industrial, scientific, agricultural, and other associations, in their Districts. 3. To appoint co-operative local committees, representing the different industries of their Districts. 4. To stimulate local action on all measures intended to render the Exhibition successful and a worthy representation of the industries of the country. 5. To encourage the production of articles suitable for exhibition. 6. To distribute documents issued by the Commission among the manufacturers and others in their Districts interested in the Exhibition. 7. To render assistance in furthering the financial and other interests of the Exhibition, and to furnish information to the Commission on subjects that might be referred to them.

All the States and Territories represented by Boards.

Headquarters on the grounds.

What the State Boards accomplished.

State appropriations.

These organizations were from time to time completed, varying in most cases in the numbers composing them, until finally, on the 17th May, 1876, it was reported to the Commission that all the States and Territories had State Boards. Of these, twenty-eight had their headquarters within the Centennial enclosure. The State Boards accomplished a vast deal to promote the success of the Exposition, but, of course, the measure of their usefulness was largely controlled by the pecuniary aid and encouragement which they received from their respective constituencies. Some of the States made liberal and timely appropriations; others made appropriations which would have been adequate, if they had been more seasonable; others, again, gave quite too sparingly; and still another class made no appropriations at all.

Other Auxiliary Agencies.

Centennial Committee of Pennsylvania.

Other influential agencies, which deserve honorable mention but cannot be described in detail, were the Centennial Committee of the State of Pennsylvania, which was located at No. 1107 Chestnut Street, Philadelphia, and whose offices were recognized by the Commission as early as May 25, 1872; the Committee of the Citizens of Philadelphia, which was appointed to aid the objects of the Commission, and with which the Executive Committee was instructed to confer and co-operate by resolution adopted December 9, 1872; and the Board of Supervisors of the Centennial Fund of Pennsylvania, created by the "Act to provide for a permanent Centennial Exposition building for the people of the Commonwealth in the City of Philadelphia."

Committee of citizens of Philadelphia.

Board of Supervisors of State Centennial fund.

Beside these, there were innumerable local Centennial organizations all over the Union, with various professional, literary, scientific, religious and benevolent societies, which, by means of public meetings and demonstrations, as well as through active private efforts, contributed valuable aid to the Commission and Board of Finance.

Local organizations

With the exception of a few of its members who permitted themselves to be influenced and controlled by local jealousies, the entire newspaper press of the country was favorably united upon the Centennial project from its inception, and proved itself throughout a most potent factor in the good work.

The newspaper press.

THE WOMEN'S EXECUTIVE COMMITTEE.

The Citizens' Centennial Executive Committee of Philadelphia, which rendered most important and effective service in procuring subscriptions, and in other ways, preliminary to the organization of the Board of Finance, conceived the happy idea of enlisting patriotic women in the cause, and appointed an Executive Committee for Pennsylvania, consisting of thirteen women, residents of Philadelphia, who effected a thorough organization on the 16th February, 1873, electing Mrs. E. D. **GILLESPIE**, President. The Executive Committee, perceiving the great value of this organization, gave it official recognition on the 24th of the same month, and after its progress had been reported to the Commission, that body, by resolutions adopted May 7th and May 10th, 1873, gratefully acknowledged its very successful exertions, and cordially commended its example to the patriotic women of other States. The Women's Executive Committee was subsequently enlarged by the addition of members from other States; committees were appointed in the various wards of Philadelphia; and co-operative associations were formed in a number of the States and Territories.

Its origin.

Organization.

Officially recognized, and commended.

Ward committees.

Co-operative associations.

The following communication from Mr. John Welsh, President of the Board of Finance, is introduced to show the value which that gentleman placed upon the labors of the Women's Executive Committee. The receipts mentioned are an acknowledgment of but two of the many sums which, from sales of Centennial stock and medals, and the proceeds of fairs, tea-parties, and similar assemblages which can only succeed under the management of the ladies, were collected by the Committee and paid over to the Board:

Results.

CENTENNIAL BOARD OF FINANCE.
PHILADELPHIA, March 13, 1875.

MY DEAR MRS. GILLESPIE, *President:*

I return Mr. Fraley's receipt for seven thousand dollars, and also for one hundred and twenty-four dollars and forty-seven cents from Meadville. As to the Bethlehem

Communication from Mr. John Welsh.

movement, I fully confirm Mrs. Jeter's view, and will approve your action in all similar cases.

Now, my dear madam, I wish you to understand how highly I appreciate the work which the ladies are doing. It is and will be one requiring much perseverance and endurance, and probably at times many mortifications and disappointments, but must result in aiding very essentially the responsible duties which have been assigned to our department. I wish you all to know that I regard your co-operation beyond price, and to realize that, when discouragements arise, there is at least one on whom such trials fall more frequently and with greater weight, but who is determined, if it be possible, to surmount them all.

Very sincerely,
JOHN WELSH,
President.

THE FOREIGN COMMISSIONS.

The following Proclamation relative to the Centennial Exhibition was issued by the President of the United States on July 3, 1873:

Proclamation by the President of the United States.

Whereas by the Act of Congress approved March third, eighteen hundred and seventy-one, providing for a National Celebration of the one hundredth anniversary of the Independence of the United States, by the holding of an International Exhibition of Arts, Manufactures, and Products of the Soil and Mine, in the City of Philadelphia, in the year eighteen hundred and seventy-six, it is provided as follows:

"That whenever the President shall be informed by the Governor of the State of Pennsylvania, that provision has been made for the erection of suitable buildings for the purpose, and for the exclusive control by the Commission herein provided for of the proposed Exhibition, the President shall, through the Department of State, make proclamation of the same, setting forth the time at which the Exhibition will open, and the place at which it will be held; and he shall communicate to the diplomatic representatives of all nations copies of the same, together with such regulations as may be adopted by the commissioners, for publication in their respective countries:'

And whereas, His Excellency the Governor of the said State of Pennsylvania did, on the twenty-fourth day of June, eighteen hundred and seventy-three, inform me that provision has been made for the erection of said buildings and for the exclusive control by the Commission provided for in the said Act of the proposed Exhibition:

And whereas, the President of the United States Centennial Commission has officially informed me of the dates fixed for the opening and closing of the said Exhibition, and the place at which it is to be held:

Now, therefore, be it known that I, ULYSSES S. GRANT, President of the United States, in conformity with the provisions of the Act of Congress aforesaid, do hereby declare and proclaim that there will be held, at the City of Philadelphia, in the State of Pennsylvania, an International Exhibition of Arts, Manufactures, and Products of the Soil and Mine, to be opened on the nineteenth day of April, Anno Domini eighteen hundred and seventy-six, and to be closed on the nineteenth day of October, in the same year.

And in the interest of peace, civilization, and domestic and international friend. ship and intercourse, I commend the celebration and Exhibition to the people of the United States; and in behalf of this Government and people, I cordially commend them to all nations who may be pleased to take part therein.

In testimony whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

[SEAL] Done at the City of Washington, this third day of July, one thousand eight hundred and seventy-three, and of the Independence of the United States the ninety-seventh.

U. S. GRANT.

By the President:
HAMILTON FISH,
Secretary of State.

POST 58, G. A. R.

Note of the Secretary of State to Foreign Ministers.

On the 5th July, 1873, the Honorable HAMILTON FISH, Secretary of State, addressed a note to each foreign minister in the United States, enclosing, for his information, a copy of the President's proclamation, and expressing the hope indulged by the President that the Government represented by the minister addressed would be pleased to notice the subject, and might deem it proper to bring the Exhibition and its objects to the attention of the people of that country, and thus encourage their co-operation in the proposed celebration. Mr. FISH further expressed the President's hope that the opportunity afforded by the Exhibition for the interchange of national sentiment and friendly intercourse between the people of both nations might result in new and still greater advantages to Science and Industry, and at the same time serve to strengthen the bonds of peace and friendship which already happily subsisted between the Government and people represented by the minister and those of the United States.

The result unsatisfactory

This action was, however, defective and unsatisfactory. The Executive Committee, in a report made to and accepted by the Commission on the 19th May, 1875, said: "The proclamation made by the President on July 3, 1873, was construed by the Honorable HAMILTON FISH, Secretary of State, as not conveying a formal invitation on behalf of the Government to Foreign Powers. His circular letter transmitting the proclamation was in terms a caution to our national representatives abroad, and, therefore, to the Governments to which they were accredited, and was calculated to denationalize the Exhibition." But fortunately, Congress, to remove this embarrassment and to remedy the discouraging attitude of the Department of State, had passed an Act, which was approved June 5, 1874, requesting the President "to extend, in the name of the United States, a respectful and cordial invitation to the Governments of other nations, to be represented and take part in the International Exposition to be held at Philadelphia, under the auspices of the Government of the United States, in the year 1876." The invitations sent out in pursuance of this Act were promptly responded to, and the acceptances which were received clearly indicated the friendly sympathy and co-operation of foreign governments.

Congress authorizes the President to extend a cordial invitation to foreign nations.

Generous response thereto.

Foreign Exhibits admitted free of duties.

To relieve Foreign Exhibitors of the burden of the ordinary customs duties, Congress passed an Act, approved June 18, 1874, exempting goods on their way to the Exhibition from the duties and

Ports of entry.

fees required by law. Regulations were subsequently issued by the Secretary of the Treasury, designating thirteen ports through which such importations might be made, and the conditions on which Exhibitors might avail themselves of the advantages thus offered. The ports of entry so constituted were the following: Philadelphia, New York, Boston, Portland, Me., Burlington, Vt., Suspension Bridge, N. Y., Detroit, Port Huron, Mich., Chicago, Baltimore, Norfolk, New Orleans and San Francisco.

Foreign Exhibits guaranteed against seizure.

To remove apprehensions which had arisen in some foreign countries that there might be contingencies under which their exhibits would be liable to seizure for possible debts of the Centennial authorities, legal opinions were solicited from the Counsellor of the Commission and the Attorneys-General of the United States and Commonwealth of Pennsylvania. These high authorities having concurred in the opinion that the laws of this State rendered the supposed danger impossible, the doubts which had existed in reference to the subject, and which at one time seemed likely to weigh seriously against the participation of foreign exhibitors, were effectually dispelled.

Change of dates of opening and closing the Exhibition.

Change in the calendar.

It was deemed of great importance to the success of the Exhibition that Exhibitors should have favorable weather for the installation of their goods, and this the Commission, after reflection, concluded could not be safely depended upon so early as the 19th April, the day which had been announced for the opening. Representations had indeed been made by several of the northerly countries that the commencement of navigation was liable to be so delayed as to make it doubtful whether their products could be delivered in season for installation before that time. The dates which had been announced by the President of the United States for the opening and closing of the Exhibition were, therefore, changed to May 10th and November 10th, respectively. This action was taken May 19, 1875, and was well received both at home and abroad. Important and acceptable changes were also made in the calendar relating to foreign exhibits, the revised issue of which was as follows:

Foreign Commissions to make definite application for amount of space required, on or before	June 1, 1875.
Foreign Commissions to furnish plans of space and lists of Exhibitors, on or before	Dec. 1, "
Reception of articles begins	Jan. 5, 1876.
" " ends	April 19, "
Unoccupied space forfeited	April 26, "
Exhibition opens	May 10, "
" closes	Nov. 10, "
Goods to be removed by	Dec. 31, "

The *International* character of the Exhibition assured.

It was now no longer a question either as to the character or extent of the foreign representation. It was evident that a larger number of nations would participate than had ever taken part in any previous Exhibition. The thorough *International* character of the Centennial Exposition, so long and anxiously labored for, was at last assured.

Foreign countries represented.

The foreign countries represented, July 1, 1876, were as follows:*

- Argentine Republic,
- Austria—Hungary,
- Belgium,
- Brazil,
- Canada,
- Chili,
- Denmark,
- Egypt,
- France, with Algeria,
- Germany,
- Great Britain, with coelonis, viz.:
    - Bahamas,
    - Bermuda,
    - British Guiana,
    - Cape of Good Hope,
    - † Ceylon,
    - † Gold Coast,
    - † Hong Kong,
    - India,
    - Jamaica,
    - † Mauritius,
    - New South Wales,
    - New Zealand,
    - Queensland,
    - † Seychelles,
    - South Australia,
    - Tasmania,
    - † Trinidad,
    - Victoria,
- Hawaii,
- Italy,
- Japan,
- Liberia,
- Luxembourg,
- Mexico,
- Netherlands,
- Norway,
- Orange Free State,
- Peru,
- Portugal,
- Russia,
- Spain,
- Sweden,
- Switzerland,
- Tunis,
- Turkey,
- Venezuela.

THE EXHIBITION GROUNDS, AND THE CEREMONIES ATTENDING THEIR TRANSFER.

The Commission visits Fairmount Park.

On the morning of March 8, 1872—the next day after the Centennial Commission had been organized—its members, in accordance with an invitation which had previously been accepted, were escorted by the Park Commission and a Committee of Philadelphia Councils to Fairmount Park. A conference with the City authorities, as provided for by the second section of the organic Act, was afterwards had, and on the 11th March, the Committee adopted a resolution declaring "that the site for holding the International Exhibition in 1876 be fixed at Fairmount Park, within the corporate limits of the city of Philadelphia."

Site of the Exhibition fixed.

Transfer of the grounds.

The Centennial Committee on Plans and Architecture having prepared the requisite specifications for plans for the Exposition buildings, addressed a communication to Hon. MORTON MCMICHAEL, President of the Park Commission, dated March 27, 1873, requesting him to designate the location and appropriate the grounds in the Park for the use of the International Exhibition. The subject was referred to the Park Centennial Committee for preliminary action, and on the 4th day of July, 1873, four hundred and sixty-five acres of the most beautiful portion of Fairmount Park, having an average elevation of over one hundred feet above the adjacent river Schuylkill, were formally transferred by the Park Commission to the Centennial authorities for the purposes of the Exhibition. The line of the enclosing fence was 16,000 feet, or over three miles in length, embracing an area of two hundred and thirty-six acres.‡

Area.

Enclosing fence.

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* For lists of the various Foreign Commissions, see Vol. II—Appendix D, pp. 47–53.

† The superintendence of the exhibits from these colonies was confided to the British Commission. The other colonies sent Commissioners of their own.

‡ The grounds provided for live-stock, trials of agricultural implements, international matches, the storage of empty boxes, etc., were not embraced in this enclosure.

Location of buildings, walks, and drives.

Within this enclosure the principal structures were grouped in the most economic, suitable, and convenient positions, and in arranging the grounds, care was taken that the walks and drives should be so laid out, that, after the close of the Exhibition, they might remain as permanent features of the Park, and as commemorative of the great event.

Character of the grounds.

The grounds embraced a great variety of natural scenery: lovely plateaus, gentle slopes, stately trees, beautiful vistas, and the rich forest which gives to the Belmont Valley and the Lansdowne Ravine their greatest charms. The walks and roads throughout the enclosure had a total length of seven miles, and apart from the principal buildings, the entire open space was dotted with the pavilions of States and foreign nations, structures erected by individuals for special exhibits, office buildings, places of entertainment, fountains, statues, vases, and other attractive objects, with intervening beds and plats of rare flowers and shrubbery.

The lakes.

The fountains.

Scenery.

North of Machinery Hall, and extending nearly to State avenue, was constructed a chain of three lakes, pleasingly fashioned in the irregularity of their borders, and constantly supplied with pure water. The principal lake is three acres in extent, and in its centre is a fountain, comprising 162 jets, arranged in three concentric circles, the exterior of which is 50 feet, the next 30 feet, and the interior 12 feet in diameter. From the centre jets, water is thrown 65 feet high. The two adjoining lakes are ornamented with smaller fountains. These features, with the marvelous beauty of the gardens adjacent to Horticultural Hall, formed a scene which pen cannot adequately picture. Viewed from the towers of the principal buildings, it was simply enchanting.*

Ceremonies attending the transfer of the grounds.

Decorations and arrangements.

Assemblage at Independence Hall.

The transfer of the grounds was attended with grand and imposing ceremonies. The time chosen for the purpose—the ninety-seventh anniversary of American Independence—was most appropriate, and no expense had been spared in decorating the City in a manner worthy of the occasion. An elaborate programme had been prepared, and many distinguished officials and personages had been invited to be present. About two o'clock. P. M., the various committees of arrangement assembled at Independence Hall. As the guests arrived, they were cordially welcomed and were conducted to the second floor of the State House, used for the meetings of Select and Common Councils. The entire building was placed under the control of the Centennial Commission and Board of Finance, who were assisted in performing their duties by the Mayor, Chief of Police, and other officials.

Officials and guests.

The Select and Common Councils met in the Common branch chamber, the invited guests in the Select branch. Among the latter were Secretary of the Navy ROBESON, representing President GRANT, who was prevented from attending on account of the death of his father; Secretary of the Treasury RICHARDSON; Secretary of War BELKNAP; Secretary of the Interior DELANO; Postmaster General CRESSWELL; Attorney General Williams; Commissioner of Internal Revenue Douglass; Commissioner of Agriculture Watts; Assistant Quartermaster General Eaton; His Excellency Governor Hartranft, with a number of Executives from other States and Territories; Secretary of the Commonwealth Quay; Adjutant General Latta; and a large array of other eminent officials and private citizens representing all portions of the country.

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*The facilities for reaching the Centennial grounds will be considered under the head of TRANSPORTATION.

Gen. Hawley led the distinguished party down stairs and into Independence Hall, and addressed Mayor Stokley as follows:

Gen. Hawley's address to the Mayor.

Mr. Mayor: I have the honor to introduce to you, sir, Secretary Robeson, Secretary Belknap, Secretary Richardson and Attorney General Williams, of the Cabinet, with Senator Scott, members of the United States Centennial Commission, members of the Centennial Board of Finance, His Excellency Governor Parker, His Excellency Governor Hartranft, and many other distinguished gentlemen, our guests of to-day.

In response, Mayor Stokley delivered the following address of welcome:

Mayor Stokley's address.

Mr. Secretary and Gentlemen: In the name and on behalf of the people of Philadelphia I bid you welcome to our city, and especially to this hall. Never, perhaps, since the Continental Congress convened within these walls and here resolved on independence, has this hall been more appropriately occupied than it is at this moment.

We are honored on this anniversary of the natal day of American freedom with the presence of our honored Secretary, representing the President of the United States, the Cabinet, and the Governors and the representatives of forty-seven free and independent States and Territories, whose mission it is to inaugurate proceedings for the due observance and celebration of the one hundredth anniversary of our independence, and to do honor to the great men who sat here and after solemn and prayerful deliberation resolved to sever the ties that bound the colonies to the mother country, and who by that act created for themselves and for posterity a government of the people.

To celebrate an event like this, and to do honor to men like these, whose fame is bounded by no country, and limited to no age, is a privilege every nation, kindred, tongue, and people who love liberty cannot fail to appreciate. Gentlemen, this hall and the grounds surrounding it have been preserved by the municipality of Philadelphia for the people of the United States; and I know, when I tender you their free use, that I but speak the united sentiments of the patriotic people of this city, whom I have the high honor on this occasion to represent.

Gentlemen, I again extend to you a most cordial welcome, and do assure you that everything will be done on the part of our citizens and the various departments of the municipal government to make your sojourn with us pleasant and agreeable.

Inspection of the Halls

After an inspection of the old hall, as well as the "Memorial Hall" immediately opposite, the entire company were, at 3½ P. M., escorted to the southern gate of Independence Square, where a procession of carriages, etc., was formed in the following order:

Order of procession.

Platoon of Police Lieutenants mounted.
Hon. Morton McMichael, and the Committee of the Park Commission.
Hon. D. J. Morrell and Committee of United States Centennial Commission.
William Sellers, Esq., and a Committee of the Centennial Committee.
Governor Hartranft, Governor Parker, and Bishop Simpson.
Members of Congress and other National guests.
Members of the Centennial Commission, Foreign Consuls, and others.
The Mayor and members of City Councils.

Route of procession.

The stand on George's Hill.

Music.

The multitudes assembled.

First Division National Guards.

The assemblage called to order.

Prayer by Bishop Simpson.

The column moved out Walnut Street to Broad; up Broad to Chestnut; out Chestnut to Eighteenth; up Eighteenth to Spring Garden; out Spring Garden to Twenty-first; up Twenty-first to Green, and out Green to the Park, where Captain CHASTEAU and a platoon of the Park Guard received the visitors and escorted them through the grounds. The sixty-two carriages drew up on the concourse on George's Hill, to the south and east of which lay the grounds designed for the Centennial buildings, which had been staked off with small flags. A grand stand had been erected, upon which seven hundred persons were crowded. From another and smaller stand Hassler's Band poured forth at intervals appropriate national airs. The crowd of spectators was immense, it being estimated that not less than twenty-five thousand persons participated in the ceremonies. About the centre of the plateau the First Division of the National Guard of Pennsylvania was drawn up, and rendered the pageant the more glittering with their splendid uniforms and accoutrements. As the guests poured upon the main stand, the band played "Hail to the Chief," which was followed by great applause from the spectators. The assemblage was called to order at precisely six o'clock, and after a most solemn and impressive invocation by the Reverend Bishop MATTHEW SIMPSON, the Honorable MORTON MCMICHAEL, President of the Park Commission, delivered the following address, making the formal transfer of the tract of 465 acres to the United States Centennial Commission:

Address by Hon. Morton McMichael.

One hundred years ago the inhabitants of thirteen contiguous but separate colonies, stretched along the Atlantic coast from the Bay of Fundy to St. Mary's river, were in the midst of an agitation which, as it touched the common welfare, met with common sympathy. Politically dependent on a distant empire, to which they were attached by the ties of lineage and language, they had submitted, if not without earnest protest, at least without forcible resistance, to invasions of their rights, to usurpations of authority, to denials of justice, and to those aggressions upon personal and municipal freedom, which most keenly affect thoughtful and sensitive natures. For a long time efforts, more or less definite, had been made to procure unity of action among them, but, owing to various causes, they had been only partially successful. In 1773, however, such measures were adopted as ultimately led to the coveted union, and secured the object for which they were and had been struggling. One hundred years have gone, and as they were then engaged in perfecting the preliminaries of the great end at which they aimed, so we now, under circumstances in some respects not dissimilar, are engaged in perfecting the preliminaries of the great work which is intended to celebrate the fruition of their labors. And as, against all discouragements—against differing opinions—against lukewarmness in one quarter and hostility in another—our ancestors persevered and triumphed, so shall their descendants persevere and triumph. As with them, so with us, the motive to exertion is patriotism; as with them, so with us, the reward of exertion shall be abundant good in the present, and still more abundant good in the future.

In all the ages of which accessible records have been preserved, no century has been distinguished by events so radical in themselves and so stupendous in their consequences as that which dates from the Declaration of Independence. Science, art, literature, philosophy, religion, the economies of peace, the waste of war, the relations of rulers to the ruled—everything, in the realms of matter or of mind, that concerns the outer and the inner life of individuals and communities—have undergone wider changes in this than in any period of equal duration. And, surely, without any imputation of

Address by Hon. Morton McMichael.

national vanity, it may be asserted that, among the occurrences of this amazing era, none are more amazing than the growth and progress of the United States. Three millions of population increased to forty millions—a narrow belt of territory enlarged until it overspreads a continent and dominates the margins of two oceans—a manufacturing industry, limited to the simplest products, expanded and diversified so that it embraces, in small things and in great, all that the brain of man can devise, and the hand of man, aided by the forces of nature and the appliances of machinery, can execute—a feeble nationality, beseeching recognition, admitted by universal consent to be the peer of the most formidable Powers of the earth—these are a part of the results which our career has accomplished. If it be fitting—and I, for one, believe it is—to celebrate with pomp and pride the centennial anniversaries of the births of men who have been famous in their own generation, and the generations which followed them, how much more fitting to celebrate the Centennial Anniversary of the birth of a Republic which, notwithstanding its alleged extravagances and short-comings, stands, and must continue to stand, in the forefront of the nations. This conceded, it may be assumed that no mode of commemoration could be adopted at once so suitable and impressive as a grand Exposition of its resources and developments, in which all civilized peoples shall be invited to participate as friendly competitors and welcome spectators. Wisely, therefore, has our national government determined upon such an Exposition—wisely has it selected, as the place where it is to be held, the vicinity in which were performed the acts it is especially designed to commemorate.

If it be the peculiar good fortune of Philadelphia that it was within her borders the Republic had its origin, beyond the mere advantage of such locality she asks no preference in any matter connected with the forthcoming Exhibition. She desires that in the broadest sense it shall be the expression of the American people, whether they dwell in the South or in the North, in the East or in the West. In this spirit she has entered upon this undertaking—in this spirit, so far as she may properly exercise any control, it is her purpose that it shall be prosecuted. Whatever she has to give that can promote its success she has given and will give without stint or hesitation; whatever of honor or recompense it may bring she hopes to share, and only to share, in just measure with all her associates. In part fulfilment of this design, her corporate authorities have come here on this consecrated day, always memorable in our annals and henceforth to be invested with fresh claims to regard, to transfer to the Commissioners of the Centennial Exposition the grounds which have been set apart as the site of the buildings they expect to erect, and which for other uses they propose to occupy. And here it may be permitted me to say, that in our vast domain no more appropriate grounds could have been chosen. Central to all sections of the country and easier of general approach than any other—admirably adapted geographically and topographically—combining ample space with picturesque beauty—bountifully supplied with the needful auxiliaries of pure water, genial air and grateful shade—they have, moreover, intimate associations with the occasion which the Exposition is meant to illustrate. Within sight of the spot where we are now assembled the fathers of the Republic met in frequent consultation and resolved upon the principles which they subsequently embodied in the great charter of our liberties. In the hospitable mansion which once adorned the estate, a portion of whose acres we are about to dedicate, the men of the Revolution, both native and foreign, were constant guests; and every rood passed over by the imposing cortege which entered the Park this afternoon has been pressed by the footsteps of Washington and his compatriots.

General Hawley: To you, sir, as the representative of the Centennial Commission of the United States, in the constructive presence of the Chief Magistrate of the Nation and the actual presence of his Constitutional advisers—in the presence of the Governor of the Commonwealth of Pennsylvania and his official staff—in the presence of the Mayor and Councils of Philadelphia—in the presence of these dignitaries gathered

Address by Hon. Morton McMichael.

from all parts of the Union to mark the national character of the ceremony—in the presence of this multitude of my fellow-citizens, who are here to sanction and approve the act—in behalf of the Commissioners of Fairmount Park, to whom its legal custody has been confided, I now, publicly and formally, transfer to your keeping all the land designated and described in the maps and papers herewith presented. And in the same behalf I hereby confer on the Centennial Commission full power to hold and possess and employ this land, for so long and in such manner, as the needs of the International Exposition, instant and prospective, may require. And, sir, this transfer, which fulfills an essential provision of the law creating your Commission, being thus made, who shall doubt that—stirred by memories of the turbulent past, urged by knowledge of the flourishing present, inspired by anticipations of the promising future—the people of the several States, and the States themselves in their sovereign capacities, as well as the Congress of the United States and all the branches of the Federal government, will so assist your endeavors that in 1876 you will be enabled to present to the world a spectacle which, while typical of the skill and culture and ingenuity of the older nations, will conspicuously demonstrate what the thrift, intelligence, enterprise and energy of our own, under the beneficent rule of free institutions, and with a due sense of reverence for Almighty God, have achieved in a single century of existence.

The transfer accepted.

Hon. JOSEPH R. HAWLEY, of Connecticut, President of the United States Centennial Commission, then delivered the following address of acceptance:

General Hawley's address.

The United States Centennial Commission accept from the Commissioners of Fairmount Park the ground upon which we stand, to be occupied as the site of the International Exhibition and Centennial Celebration in 1876. By its convenience of access from all parts of the Union, by its beauty, and, most eminently, by its historical associations, it is specially adapted to the use to which it is now dedicated. In the name of the Commission, and of the good work in which we are engaged, I most heartily thank you, sir, your associate Commissioners, and the authorities of the noble City of Philadelphia, for your patriotic action and the generous words that accompany it.

The day, the distinguished audience, and the multitudinous historical associations of the region round about us, afford more than ordinary temptations to indulge in the reminiscences, reflections and prophecies usual on this anniversary. But while I venture for a few minutes beyond the simple duty of acceptance, which I have already discharged, it will be only to seize this favorable opportunity to commend to universal popular favor the propriety and duty of this enterprise.

Seldom or never could a people so properly point to one day and one deed, as the time and the deed when and by which, under the blessing of God, they entered into the assembly of nations a distinct individuality, with all the inalienable rights and duties of nationality. Every intelligent citizen of all our forty-millions—every inhabitant of the globe with brain enough to comprehend the idea of government and of national entity, and heart enough to nourish the sentiment of patriotism, would instinctively assert that the Centennial Anniversary of our birth as a nation ought to be celebrated. Equally do all men say it is fit and indispensable that thousands of local observances should be crowned by one grand national festival.

The place where that festival should be held is designated by almost equally instructive and universal selection. Here the Continental Congress held its first session; here George Washington was called to the command of the Continental Army; here is the Hall where the Declaration was adopted; here is the Bell whose clang proclaimed "Liberty throughout the land unto all the inhabitants thereof;" here the Convention met, in a house yet standing, to devise the Federal Constitution, whose wisdom the trials of nearly a century have justified; here was the first official residence of a President of

General Hawley's address.

the United States. Along and near the historic Schuylkill are the houses of the patriots of the dark days; battle-fields of the weary seven years' struggle, and that spot of painful but proud fascination—Valley Forge.

But there should be something more than merely a day's rejoicing—the day of bonfires, illuminations, cannon, bell-ringing, and orations, foretold by John Adams. There should be a year of jubilee. Some countries fill their history with the record of revolutions, usurpations, assassinations, battles, and devastation. Rude kings and fighting men fill the picture. The century we contemplate is the era of the newspaper, the telegram, the steamship, the railway, the photograph; the reapers and mowers, rotary presses and sewing machines; of wondrous spinners and looms—the time when art and science, not confined to the reproduction of oriental magnificence for a few, deem it their pride both to explore new realms for the beauty of abstract truth, and, by exquisite and million-fingered machinery and miraculous inventions, to apply that truth to supplying the daily moral, mental, and physical wants of the multitude. Among the good things of the new and the better day are international exhibitions. Again I speak of that which the universal voice has approved, as delighting the eye, cultivating the taste, quickening invention, aiding industry, and promoting fraternity.

After referring at some length to the Congressional legislation which had been adopted in reference to the Centennial Exhibition, he proceeded:

Thus much then is determined and settled beyond the reach of practical criticism or debate. We *shall have* on the spot whereon we stand a Centennial Celebration and International Exhibition in the year 1876, under national auspices, with professedly national aims and support.

Now, my fellow-citizens, you, in bodily presence listening here, and you who listen by lightning and the press, I come to a question which I ask with intense anxiety: Shall this celebration and International Exhibition be truly successful ? It will require generous gifts of money, and equally generous gifts of labor. It must have a hearty, loving support from every State and Territory. I cannot doubt the result. When 1876 shall have arrived the whole land will be stormy with the light and the song and the roar of a jubilee. But we must begin now. We have begun the involving, perplexing, tedious, costly labors that must indispensably precede a successful exhibition by at least three years: your Commissioners already begin to feel the pressure of the shortening time. It is just and necessary that we should say here that the citizens of Pennsylvania, and especially of this goodly city, have done more than their share of the work up to this day. With a thoughtfulness, courtesy, generosity, and integrity of administration that cannot be praised to excess, they have insisted that if any think them moved by thoughts of local gain, they will so give as to make the indication unquestionable, and they have placed under our control more than three millions of dollars. Philadelphia alone has given a million and a half, two-thirds of it by private subscription, and it has not thought of quitting.

The time has fairly arrived when all preliminary questions are so far determined that the citizens of other States may fairly ask: What share shall we take in this work for the good of the country, the honor of our State, and the satisfaction of our own souls?

A distinct corporation, entitled the Centennial Board of Finance, has been organized, charged with the duty of collecting the remainder of the necessary funds. At its head are twenty-five directors, selected from men eminent in the wisdom of material affairs, and above even suspicion in their fidelity. They accept the trust with ready zeal and firm purpose. Perhaps I blush a little in feeling that it may not be out of place to give you these assurances of integrity in the management of even this national and patriotic enterprise. We cannot escape all errors of judgment; but if the people clearly discover a corrupt breach of trust on the part of any person charged with this sacred work, we shall say only, "Shoot him on the spot!"

General Hawley's address.

There is one agency through which this noble enterprise can be made gloriously successful. Without that agency its success will be utterly impossible. We, therefore, turn frankly to the the press and say, "you see that this celebration and Exhibition are determined upon beyond recall. You have given your approval and in a large measure caused what progress has already been made. We entreat you to take up the work now as your own. Make it a work of pride, of patriotism, of reconciliation, and brotherhood. You reach every family in the land. Bear the subject in mind from day to day and week to week, and cultivate, as you so well know how, first attention and interest, then participation, and finally an active enthusiasm, marching on to magnificent triumph. You of the press, the heralds and generals of the march of civilization, have this matter in your hands. Come over and help us. Take us up and carry us along."

One point more that has a particular interest to Americans. It has become a fundamental article in our creed that there is nothing worth doing by a whole people that cannot be best done by a free people. Kingly and imperial governments have done well with international exhibitions. Can a general assembly of forty millions of the people do better? Inasmuch as we all say that work should be well done, the doing will be in some degree a test of the adaptability of a democracy to a project requiring of millions of people harmonious and continuing contributions of labor and money. Well as we have done in some things in the expositions of the Old World, we have been far from appearing in all, or even most departments, to our own satisfaction. Let us for once be able to say to the world, "Come and see, for here our people and land are fairly presented."

But I have one more consideration that I am sure will touch you all. I think we have substantially done with diverse sectional interests. We have finished all the work of the late war, and its sequences, have we not? God grant—amen and amen—that we may never again be killing each other in an awful war about diverse views of human rights, or State rights, or Federal rights. Here comes, in another sense, our opportunity in 1876. We shall meet on the 19th of April, the anniversary of Lexington; the Exhibition will close on the 19th of October, the anniversary of Yorktown. In the intervening six months, marked by the due observance of July 4, let us bring the representatives of every State and county and township here upon the soil sacred to liberty and fraternity, under one flag and name, and avowing one destiny. For that time let us forget even our wholesome and profitable debates upon minor politics. For all time let us forget our sore trials and bitter quarrels, and so begin the new century in happy accord and with the strongest pledges and highest hopes.

And we shall open wide our arms to our brethren of all nations and lands. Wherein they surpass us we shall confess and learn wisdom; wherein we surpass them we shall only say such and much more can best be done under a government of, by, and for the people.

In token that the United States Centennial Commission now takes possession of these grounds for the purpose we have described, let the flag be unfurled and duly saluted.

The flag unfurled.

As the last words were uttered, the speaker pointed to the flag; a twitch of the halyards, and the emblem of the Republic floated proudly upon the breeze; a signal from the trumpeter of the City Troop, and the Keystone Battery thundered away with guns in honor of the occasion. The scene was indescribable. The orchestra played the "Star Spangled Banner," and the multitude sent up a shout which was an emphatic earnest of their intention to make the Exhibition a success. After this burst of patriotism had subsided, his Excellency, Governor HARTRANFT, delivered the following address:

Grand salute.

Enthusiasm of the people.

Governor Hartranft's address.

By the act of Congress creating a Commission charged with the holding of the Centennial Exhibition in this city in the year 1876, it was made the duty of the Governor of Pennsylvania to certify to the President of the United States the fact that provision has been made for the erection of suitable buildings for said Exhibition, whenever he became satisfied that such result had been achieved.

I hold in my hand a joint certificate, signed by General Joseph R. Hawley, President of the Centennial Commission, and Mr. John Welsh, Chairman of the Finance Committee of said Commission, to the effect that such provision has been made. Knowing, as you all know, the wisdom and integrity of these gentlemen, I have felt it my duty to certify to the President of the United States, as required by act of Congress, and the certificate reads as follows:

To the President of the United States.

Pursuant to the provisions of section 8 of the act of Congress approved March 3, 1871, providing for a National Celebration of the one hudredth anniversary of American Independence, a copy of which act is appended hereto, the undersigned, Governor of the State of Pennsylvania, has the honor to inform the President that provision has been made for the erection of suitable buildings for the purposes of the International Exhibition of Arts, Manufactures, and Products of the Soil and Mine, proposed to be held in Philadelphia, in the year 1876, and for the exclusive control of the said Exhibition by the United States Centennial Commission.

The undersigned makes this announcement to enable the President, in accordance with the requirements of the act above mentioned, to issue his proclamation concerning the said Exhibition, and to cause official invitations to be given to foreign governments to participate therein.

JOHN F. HARTRANFT.

HARRISBURG, June 24th, 1873.

So far, this grand project has, to some extent at least, appeared local, necessarily so by the conditions imposed; but henceforth it will be purely national. If a failure, it will be a national failure. If a success, a national success.

We have assembled here to dedicate a portion of this beautiful Park to the uses of this great international exhibition, which is to commemorate the anniversary of our country's birth. Upon the threshold of the century to expire in 1876 thirteen poor and feeble colonies, with no common ties other than their love of liberty and their hatred of oppression, declared their independence. These thirteen colonies, with their offspring, now increased in number to thirty-seven, stretch their empire across a continent, and afford the grandest exhibiton of a nation's progress in the world's history. In all the wondrous changes wrought in the nineteenth century, none are so wondrous and conspicuous as the industrial, moral and physical growth of this our native land. With those powerful auxiliaries, steam and telegraph, both of which our country gave to mankind, we are striding with majestic steps towards a dominion unrivalled by any nation on the face of the earth. Let us then, from every State—north, south, east, and west—bring to this great city, the consecrated place where our liberty was born, the evidences of our culture, the proofs of our skill, and our vast and varied resources, that the world may have a glimpse of our enlargement, industry, wealth and power, and to the myriads who will gather here from every clime we must be ready to accord a welcome in keeping with the dignity of the country.

To this city, then, and to the Exhibition the Republic bids welcome the people of every nationality, assuring them of a cordial reception, and just and generous recognition. And here, too, let our own people gather, and garnering new and fresh ideas from a survey of the world's arts and industries, let us dedicate ourselves to a higher civilization, to more extensive fields of development, to more liberal and more diffused education, to the purification of our institutions and the preservation of the liberty which is the foundation-stone of our happiness and prosperity as a people.

Hon. GEORGE M. ROBESON, Secretary of the Navy, who appeared as the delegated representative of the President of the United States, was then introduced, and spoke as follows:

Address by Secretary Robeson.

Prevented from being himself present on this interesting occasion only by the calls of imperative personal duty, the President of the United States has directed me, as his representative, and as the representative of the State Department for the occasion, to make, by his authority and in his name, the following proclamation:

The distinguished gentleman then read the President's Proclamation and the general regulations relative to the opening and conduct of the Exhibition, and the invitations extended to Foreign Nations;* after which he resumed his remarks, as follows:

Mr. President and Gentlemen: In making this proclamation the President desires to express his deep personal interest in the objects of your great enterprise, his sympathy with your patriotic endeavors, his appreciation of the fitness of the place and the occasion designated; his earnest desire that "all nations" will take part in this exhibition of human industry and skill on the great memorial occasion of a people whose energies are drawn from every land, and his hope and confidence that in its spirit and its success the "Exhibition and Celebration" will remain a lasting illustration of peace and civilization, of domestic and international friendship and intercourse, and of the vitality of those great principles which lie at the foundation of human progress and upon which depend our national strength, development, and safety. With this expression, the great Exhibition is commended to the patriotism of the whole people and the co-operation of the world.

Applause.

The addresses were all well received, the speakers being frequently interupted by shouts of applause from the immense assembly.

Review of the Military.

A grand review of the military by Secretary of War Belknap, Governor Hartranft, General Robert Patterson, General George Cadwalader and others, followed the conclusion of the transfer ceremonies. The line was formed on the field to the south and west of the stage, the City Troop having the extreme right, and the Fifth (colored) Brigade the extreme left of the line, and in this position the column moved past the stand, from which the review was made. The following were in line: First Brigade; First Troop City Cavalry; Artillery Corps; Washington Grays (dismounted); Keystone Battery; Weccacoe Legion; Second Regiment Infantry; Sixth Regiment Infantry; Second Brigade; First Regiment Infantry; Third Regiment Infantry; State Fencibles; Fifth Brigade; the following bands being also in line, viz., Navy Yard Band; Sixth New Jersey Regiment Band; McClurg's Band; and State Fencibles' Drum Corps.

Banquet at Belmont Mansion.

In the evening a grand banquet was given at Belmont Mansion, in Fairmount Park, under the auspices of the Centennial Commission and Board of Finance. General Hawley presided, and able and patriotic speeches were made by the following distinguished guests: Secretary of the Navy Robeson, Attorney General Williams, Governor Parker (New Jersey), Hon. A. R. Boteler (West Virginia), Hon. John Scott, Hon. Wm. D. Kelley, ex-Governor Bigler, ex-Governor Curtin, Mr.

The Speakers.

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*See title "The Foreign Commissions," pp. 102-103.

ADOLPH LECORA (representative from Switzerland), Mayor STOKLEY, and Mr. JOHN WELSH.

WATER, DRAINAGE, AND GAS.

Water.

An abundant supply of water for the purposes of the Exhibition being essential, and the demand upon the pumping and storage capacity of the City Works being largely increased in 1876 by the great influx of people quartered in its various sections, it was deemed prudent and wise to take such measures as would secure an independent supply of that indispensable element, for use within the Centennial enclosure. Accordingly, the Board of Finance, after consultation with the City authorities, caused temporary pumping works to be constructed at the river Schuylkill, near the Belmont steamboat landing.

Centennial water-works, and their capacity.

The engine-house contained a Worthington engine,* capable of pumping 5,500,000 gallons of water in twenty-four hours. An auxiliary engine, capable of pumping 1,000,000 gallons per day, was provided in case of accidents. The water was forced to a stand-pipe, located in the rear of the Art Gallery, the pipe being constructed of wrought-iron, 120 feet high, and 4 feet in diameter, with an entire altitude of 208 feet above the Schuylkill river. The total quantity of water raised to an average height of 200 feet above the river, during the six months the Exhibition was open, was 383,865,497 United States gallons, equal to an average of 2,181,053 gallons per day of twenty-four hours.

Number of gallons raised.

Drainage.

An excellent system of drainage for the buildings and grounds was devised and constructed, thereby promoting the convenience of the occupants and visitors, and serving the purposes of utility and health.

Gas.

Appreciating the requirements of the Exhibition and surrounding avenues for a supply of gas, the trustees of the City Gas Works extended their mains to Belmont and Elm Avenues, from which points gas was supplied by service pipe as desired. The total quantity of gas consumed within the Centennial enclosure, from April 27, 1876, to October 31, 1876, was 24,793,300 cubic feet, and from February 24, 1876, to December 28, 1876. the total quantity was 34,240,100 cubic feet.†

Number of cubic feet consumed during certain periods on the Exhibition Grounds.

THE BUILDINGS.

Order of the descriptions

For the sake of order and convenience, the descriptions of the various Buildings, Fountains, Statuary, and other like objects of interest on the Centennial Grounds, have been classified alphabetically under the following heads, viz.:

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*Furnished free of cost, as an exhibit, by Mr. Henry Worthington, of Brooklyn, N. Y.

†These figures have been kindly furnished by Mr. Martin W. Culp, Receiver in the City Gas office. The number of cubic feet of gas consumed within the Centennial enclosure during the six months of the Exhibition has not been stated.

The Buildings.

1. Principal Exhibition Buildings and Annexes.
2. Offices of the Centennial Authorities.
3. State and Municipal Buildings.
4. Foreign Buildings.
5. Special Exhibition Buildings and Out-Door Exhibits.
6. Bank and Bankers' Buildings.
7. Railroad Offices.
8. Catalogue, Newspaper and Publishing Buildings.
9. Places of Refreshment.
10. Monuments, Fountains, Statuary, etc.
11. Music Pavilion and Camping Grounds.

Numbers assigned to buildings.

The numbers mentioned in the descriptions are those which were assigned to the Buildings by the proprietors of the "Visitors' Guide," with the consent and approval of the Director General, as provided for by contract with the Centennial Board of Finance. A separate set of numbers was adopted for each of the following four subdivisions of the Exhibition Grounds, and they indicated the location of the Buildings thus:

General locations.

1. Buildings located south of the Avenue of the Republic, were numbered between 1 and 50.

2. Buildings located north of the Avenue of the Republic and west of Belmont Avenue, were numbered between 50 and 100.

3. Buildings located east of Belmont Avenue and south of Fountain Avenue, were numbered between 100 and 150.

4. Buildings located east of Belmont Avenue and north of Fountain Avenue, were numbered between 150 and 200.

Principal Exhibition Buildings and Annexes.*

Agricultural Hall.

Agricultural Hall and Annexes.—Agricultural Hall (No. 152) stood east of Belmont Avenue, and north of Horticultural Hall. In its construction was illustrated a novel combination, the materials employed being mainly wood and glass. The building consisted of a long nave crossed by three transepts, all composed of Howe truss arches of Gothic form. The four courts between the nave and transepts, as well as the four spaces at the corners of the structure, having the nave and transepts for two of their sides, were roofed and formed spaces for exhibits. The nave ran north and south through the centre of the building, and was 820 feet long and 125 feet wide, with a height of 75 feet from the ground to the top of the arch. The remaining three transepts ran east and west, one at each end of the building 540 feet long and 30 feet wide, and one in the centre 540 feet long and 60 feet wide. The building was thus divided into sections, each of which had aisles, 197 feet long and 13 feet wide, extending through it and communicating with the avenues and passage-ways. The entire structure covered 10$\frac{1}{4}$ acres of ground, and

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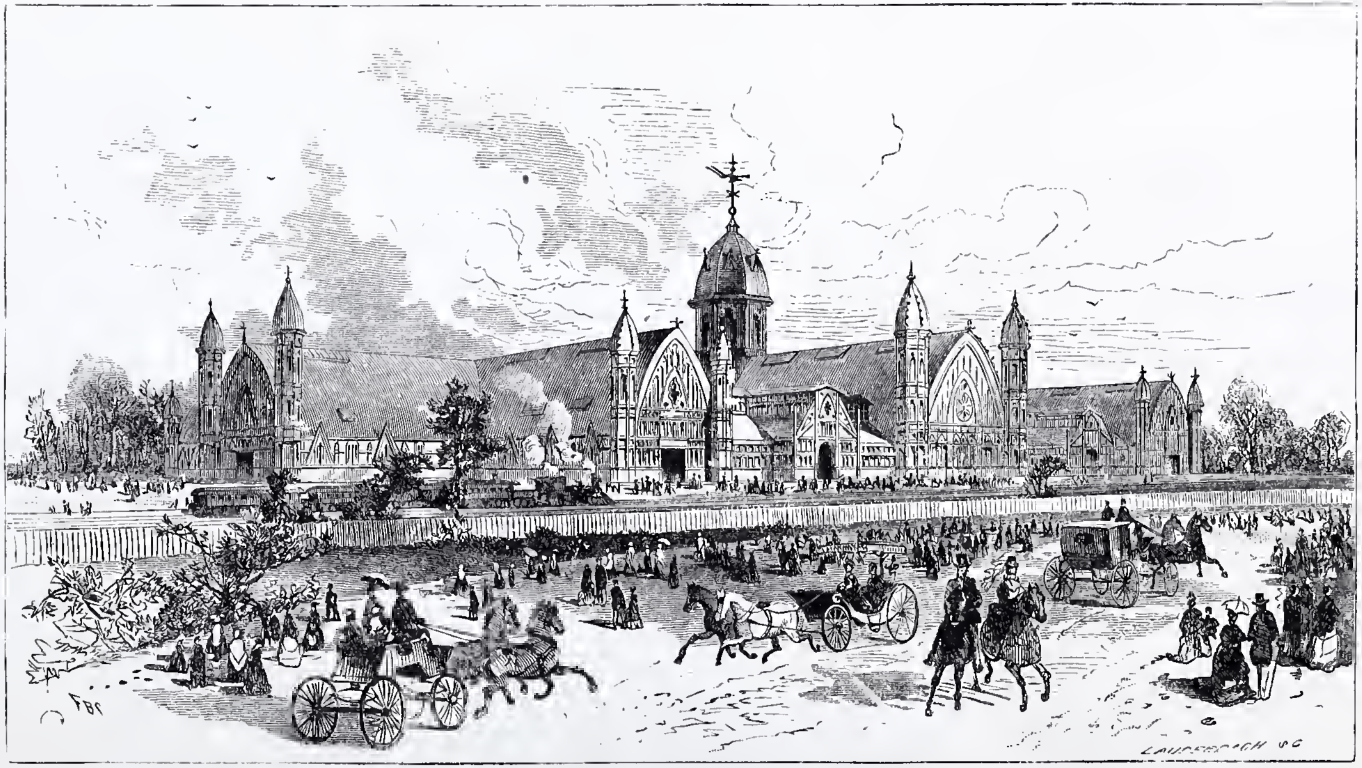
* See Introduction to Vol. II, pp. xiv-xv; and see also Ground Plans, *id.*, pp. xvii, etc.



Agricultuarl Hall.

Agricultural Hall.

its arrangements both for exhibitors and visitors were admirable. An ample supply of steam-power was furnished for that portion of the building in which agricultural machinery was displayed. The general appearance of the structure was not unlike that of a great cathedral. The location was advantageous, commanding an excellent view of the Schuylkill river and the north-western suburbs of Philadelphia lying beyond. Looking at the building across the Belmont valley, from a point on Fountain Avenue, west of Horticultural Hall, the view was exceedingly picturesque. The contract for the erection of Agricultural Hall was made July 26, 1875. The building was commenced in September following, and was finished in April, 1876, at a cost of $260,000. Architect, James H. Windrim; contractor, Philip Quigley; wrought-iron furnished by Allison & Sons; erectors, Bell Brothers.

Annexes to Agricultural Hall.

ANNEXES.—*The Wagon Building* (No. 165) was located north of Agricultural Hall, and was, in size, 144 feet by 196 feet. It was constructed of wood, one story high, and consisted of three lines of sheds. It was used for the display of farm wagons, trucks, and other articles of agricultural administration. *The Pomological Building* (No. 166) was in the form of a parallelogram, 182 feet by 192 feet, and was situated east of Agricultural Hall. It was constructed of wood, one story high, and was used for the display of fruits, vegetables, butter, cheese, honey, poultry, etc. *The Brewers' Building* (No. 167)—a parallelogram in form, and in size 96 feet by 272 feet—was constructed of wood in the style of Machinery Hall, and was situated between Landsdowne Drive and the north-east corner of Agricultural Hall. It contained a model brewery, and in it were shown the several processes of manufacturing malt liquors. Although erected under the auspices of the United States Brewers' Association, it was generally regarded as an Annex to Agricultural Hall, its exhibits being nearly all classified under Department VI. *The Butter and Cheese Building* (No. 162) was a model factory, built of wood, three stories high, in size 100 feet by 116 feet, and was situated east of the Agricultural Building, between it and Landsdowne Drive. *The Boiler House* (No. 176) was a small structure, situated 200 feet east of Agricultural Hall, and supplied the steam-power used in that structure.

Horticultural Hall.

HORTICULTURAL HALL AND ANNEX.—Horticultural Hall (No. 151), with its Annex and surrounding grounds, contained the exhibits in Department VII of the International Exposition. It was erected through liberal appropriations made by the City of Philadelphia, is extremely ornate and commodious, and is to remain in permanence as one of the attractions of Fairmount Park. It is located on the Landsdowne Terrace, a short distance north of the Main Building and Memorial Hall, and has a commanding view of the Schuylkill river and the north-western portion of the city. The design is in the Moresque style of architecture of the twelfth century, the principal materials externally being iron and glass. The building is 383 feet in length and 193 feet in width, and its height to the top of the lantern, 72 feet. The main floor is occupied by the central

Horticultural Hall.

conservatory, 230 feet by 80 feet, and 55 feet in height, surmounted by a lantern 170 feet long, 20 feet wide, and 14 feet high. Running entirely around this conservatory, the centre of which is adorned by a marble fountain, there is a gallery 5 feet wide, at a height of 20 feet from the floor. On the north and south sides of this principal room are four forcing houses for the propagation of young plants. These forcing houses are each 100 feet by 30 feet, and covered with a curved roof of iron and glass. A vestibule 30 feet square divides the two forcing houses on either side. At the centre of the east and west ends are similar vestibules, on either side of which are apartments for restaurants, reception-rooms, offices, etc. Ornamental stairways lead from the vestibules to the internal galleries of the conservatory, as well as to the four external galleries, each 100 feet long and 10 feet wide, which surmount the roofs of the forcing houses. These external galleries connect with a grand promenade, formed by the roofs of the rooms on the ground floor, which has a superficial area of 1,800 square yards. The east and west entrances to Horticultural Hall are approached by flights of blue marble steps from terraces 80 feet by 20 feet, in the centre of each of which stands an open kiosque 20 feet in diameter. The angles of the main conservatory are ornamented with eight fountains. The corridors connecting the conservatory with the surrounding rooms open fine vistas in every direction. Provision is made for the illumination of the structure by 3,500 burners. The kitchen, store-rooms, coal-houses, ash-pits, heating arrangements, etc., are located in the basement, which is of fireproof construction.

Annex to Horticultural Hall.

ANNEX.—This was a temporary structure (No. 170), built of glass and iron, and located immediately north of Horticultural Hall. It was designed for the display of specialties in flowers. The exhibition of rhododendrons, one of the most attractive features during the early part of the Exposition, was held in this Annex.

Machinery Hall.

MACHINERY HALL AND ANNEXES.—Machinery Hall (No. 2), with its several Annexes, contained the exhibits in Department V of the International Exposition. It is located in Fairmount Park, west of the intersection of Belmont and Elm Avenues, and is distant 542 feet from the west front of the Main Building, and 274 feet north of Elm Avenue. The north front is on the same line as that of the Main Building, thus presenting a frontage of 3,824 feet from the east to the west ends of the exhibition buildings upon the principal avenue within the grounds. The structure consists of a main hall 1,402 feet long and 360 feet wide. The entire area covered is 558,440 square feet, or nearly 13 acres, and, including the upper floors, 14 acres of floor space are provided. The chief portion of the building is one story high, the main cornice on the outside being 40 feet from the ground. The interior height to the top of the ventilators in the avenues is 70 feet, and in the aisles 40 feet. The long lines of the exterior are broken by projections upon the four sides, and the main entrances are finished with facades extending to 78 feet in height. The east entrance forms the principal approach from the Main Building, Machinery Hall.

and from the street-cars and Pennsylvania Railroad Centennial depot. Along the south side were placed the annexes, boiler-houses, and other buildings for special kinds of machinery. The ground plan gives two main avenues 90 feet wide and 1,360 feet long, with a central aisle between and an aisle on either side. These aisles are each 60 feet wide, and with the two avenues make a total width of 360 feet. At the centre of the building there is a transept 90 feet wide, which at the south end extends beyond the main hall. This transept begins at 36 feet from the main hall, and extends 208 feet; it is flanked on either side by aisles 60 feet wide, and forms a Department for hydraulic machines. The promenades in the avenues are 15 feet wide; in the transepts 25 feet; and in the aisles 10 feet. The other walks extending across the building are each 10 feet wide, and lead at either end to exit doors. From the west entrance is afforded the most direct communication with George's Hill, from which point may be obtained the best view of the entire Exhibition grounds. The foundations are piers of masonry, and the superstructure consists of solid timber columns which support roof-trusses, constructed with the straight wooden principals and wrought-iron ties and struts. As a general rule the columns are placed lengthwise of the building, at the uniform distance of 16 feet apart. They are 40 feet in height to the heel block of the 90 feet span roof-trusses over the avenues, and they support the heel of the 60 feet spans over the aisles, at the height of 20 feet. The outer walls are of masonry to a height of 5 feet; above that they consist of glazed sash placed between the columns, portions of the sash being movable for ventilation. Louvre ventilators are placed in continuous lengths over both avenues and aisles. The building stands lengthwise nearly east and west, and is lit entirely by side light. Machinery Hall was put under contract January 27, 1875; work was immediately commenced, and the structure was completed October 1, 1875, at a cost of $542,300. Engineers and architects, Henry Pettit and Joseph M. Wilson; contractor, Philip Quigley; wrought and cast iron furnished by Pusey, Jones & Co. There were used in the construction 5,000,000 feet of lumber; 500,000 pounds of cast-iron; 750,000 pounds of wrought-iron; 20,000 pounds of nails and spikes; 700,000 square feet of tin-roofing; 150,000 pounds of American glass; and 15,000,000 pounds of stone.

Annexes to Machinery Hall.

ANNEXES.—*The Department for Hydraulic Machinery*—generally called the Hydraulic Annex—is 210 feet long and 208 feet wide, and contains a tank 160 feet long by 60 feet wide. Here were exhibited all sorts of hydraulic machines in full operation. At the south end of the tank was a waterfall 35 feet high and 40 feet wide, which was supplied from the tank by the pumps on exhibition. *The Stokes & Parrish Machine Shop* (No. 3),—size, 112 feet by 60 feet,—constituted a part of one of the Annexes, and in it were executed repairs and machine work for exhibitors. The three *Boiler-Houses*,—the *Corliss* (No. 5), the *American* (No. 4), and the *English* (No. 6),—which furnished steam for the engines in Machinery Hall, were also regarded as Annexes. *The Shoe and*

Annexes to Machinery Hall.

Leather Building, a description of which will be found under its proper head, was sometimes called an Annex to Machinery Hall, but although considerable Shoe and Leather machinery was displayed in it, by far the greater part of its space was devoted to the exhibits classified in Departments II and VI. These structures were all located south of Machinery Hall. The following were located west of it, near the junction of Fountain and Elm Avenues, viz.: *Sawmill Annex* (No. 19), *Boiler House* (No. 20), and *Stokes & Parrish's Boiler House* (No. 42). The *Store House* (No. 32), was a one-story brick building, 10 feet by 10 feet, and was used for the storage of oil for the Machinery Department. It stood between the Nevada Quartz Mill and the barrier.

Main Building.

MAIN BUILDING AND ANNEXES.—The Main Exhibition Building (No. 1), with its Carriage and Mineral Annexes, contained nearly all of the exhibits in Departments I, II and III of the International Exposition. It is located in Fairmount Park, on the Landsdowne plateau, east of Belmont and north of Elm Avenues, and is in the form of a parallelogram, extending east and west 1,880 feet in length, and north and south 464 feet in width. The larger part of the structure is one story high, the main cornice on the outside being 45 feet above ground, and the interior height 70 feet. At the centre of the longer sides are projections 416 feet long, and at the centre of the ends or short sides are projections 216 feet long. These projections contain the four main entrances, with arcades on the ground floor, and central facades 90 feet in height. The east entrance formed the principal approach for carriages, visitors being permitted to alight under cover of the arcade. The south and west entrances formed the main approaches from the street and steam cars, the principal street railway concourse being conveniently located on Elm Avenue, and the Pennsylvania Railroad Centennial Depot in close proximity. On the south side the main portal leads to the Memorial Hall; on the west side the main portal gives the principal passage-way to Machinery Hall. On the corners of the building are four towers 75 feet high, and, between these and the central projections or entrances, is a lower roof with a cornice 24 feet above ground. The roof over the central part, for 184 feet square, is elevated above the surrounding portion, and four towers, 48 feet square, and rising to a height of 120 feet, stand at the corners of the elevated roof. The floor-areas are as follows:

	SQUARE FEET.	ACRES.
Ground floor	872,320	20.02
Upper floors in projections	37,344	.85
" " in towers	26,344	.60
Totals	936,008	21.47

The ground plan shows a central avenue or nave 120 feet wide, and 1,832 feet in length—the longest avenue of that width ever introduced into an Exhibition building. On either side of this nave is an avenue 100 feet wide, and 1,832 feet long. Between the nave and side avenues

Main Building.

are aisles 48 feet in width, and, on the outer sides of the building, aisles 24 feet in width. The great length of the roof lines is broken by three cross avenues or transepts of the same width, placed in the same position relatively to each other as the nave and avenues running lengthwise, namely, a central transept, 120 feet wide by 416 feet long, with one on each side 100 feet by 416 feet, and aisles between of 48 feet. These avenues and transepts, intersecting in the central part of the building, divide the ground floor into nine open spaces, free from supporting columns, covering in the whole an area of 416 feet square. Of these spaces four are 100 feet square, four 100 feet by 120 feet, and the central space or pavilion 120 feet square. Four interior courts, 48 feet square, one at each corner of the central space, are produced by the intersections of the 48 feet aisles. The promenades through the nave and central transept are each 30 feet wide, and those through the centre of the side avenues and transepts are each 15 feet wide. The other walks are 10 feet in width, and lead to exit doors at either end. The foundations consist of piers of masonry, and the superstructure of wrought-iron columns supporting iron roof trusses, the columns being composed of rolled channel bars with plates riveted to the flanges. The columns lengthwise the building are uniformly 24 feet apart. Of the 672 columns employed, the shortest is 23 feet, and the longest 125 feet in length, their aggregate weight being 2,200,000 pounds. The following are the principal dimensions of the different parts of the building, the measurements being taken from centre to centre of the supporting columns:

Length of building	1,880	feet.
Width of building	464	"
CENTRAL AVENUE OR NAVE.		
Length	1,832	feet.
Width	120	"
Height to top of supporting columns	45	"
Height to ridge of roof	70	"
CENTRAL TRANSEPT.		
Length	416	"
Width	120	"
Height to top of columns	45	"
Height to ridge of roof	70	"
SIDE AVENUES.		
Length	1,832	"
Width	100	"
Height to top of columns	45	"
Height to ridge of roof	65	"
SIDE TRANSEPTS.		
Length	416	"
Width	100	"
Height to top of columns	45	"
Height to ridge of roof	65	"
CENTRAL AISLES.		
Length at east end	744	feet.
" at west end	672	"
Width	48	"
Height to roof	30	"
SIDE AISLES.		
Length at east end	744	"
" at west end	672	"
Width	24	"
Height to roof	24	"
CENTRE SPACE OR PAVILION.		
Ground plan	120	ft. sq.
Height to top of supporting columns	72	"
Height to ridge of roof	96	"
TOWERS OVER COURTS.		
Ground plan	48	"
Height to roof	120	"
CORNER TOWERS.		
Ground plan	24	"
Height to roof	75	"

The roof trusses are similar to those generally used for depots, and con-

Main Building.

sist of straight rafters with struts and tie-bars. The aggregate weight of the roof trusses and girders is 5,000,000 pounds. The sides of the building, to the height of seven feet from the ground, are finished with brickwork in panels between the columns. Above the seven feet the finish is of glazed sash, portions of which are movable for ventilation. The roof is tin on sheathing boards; the ground floor of plank upon sills resting on the ground, with no open space beneath. The exterior of the structure is ornamented with galvanized iron octagonal turrets, extending from the ground to above the roof, some of which are surmounted with flag-staffs and others with eagles. Appropriate emblems are placed over each of the main entrances. The building both inside and outside is tastefully painted and decorated, and during the Exposition was profusely and elegantly adorned with the flags of all nations. There are sky-lights over the central aisles, but the building is lighted almost entirely by side light from the north and south sides. Louvre ventilators are placed over the central nave and each of the avenues. Balconies or galleries, from which views of the whole interior may be obtained, are provided in the four central towers. The system of water supply, for protection against fire and for sanitary purposes, is complete. The offices for the administration were in the ends of the building and on the second floor; those for foreign commissions were along the sides of the building, in close proximity to the exhibits. The edifice stands nearly due east and west. Its form and appointments, with the uniform distribution of light afforded, gave all exhibitors an equally fair opportunity to display their goods to advantage. The Departments of the Classification were placed in parallel sections running lengthwise of the building, from east to west, and the countries exhibiting were located geographically in sections running crosswise of the building, from north to south. The building was erected as a temporary structure, the columns and trusses being so designed that they may readily be taken down and re-built on another site. There were used in the construction four miles of pipe, 7,000,000 feet of lumber, and 8,500,000 pounds of iron. The wrought and cast iron was manufactured by Wm. Sellers & Co., the wrought iron being furnished by A. & P. Roberts, and the cast iron by Morris, Tasker & Co. The construction was under the direction of Henry Pettit and Joseph M. Wilson, architects and engineers; R. J. Dobbins was the contractor, and the Watson Manufacturing Company erected the iron work. The ground was graded and the foundation laid in the fall of 1874; the erection of iron work commenced May 8, 1875, and was finished December 2,1875; and the work—on which 3,000 men had been employed—was accepted from the contractor on the 14th day of February, 1876. The building cost $1,600,000, and at the public sale held by the Centennial Board of Finance, on the first December, 1876, it was purchased by the Permanent International Exhibition Company for $250,000.

Annexes to Main Building.

ANNEXES.—There were two *Mineral Annexes* (No. 46)—built of wood, and each one story high—which formed an extension of the Main

Memorial Hall.

Annexes to Main Building.

Building, east of its south central entrance. They contained the greater part of the American exhibits in Department I—Mining and Metallurgy—and were erected at a cost of about $20,000. *The Carriage Annex* (No. 106) was a one-story structure, built of wood, corrugated iron, and glass, with skylights, and was situated north of the Avenue of the Republic, opposite the western portion of the Main Building. It was designed chiefly for the exhibition of carriages and similar vehicles, but contained a variety of other manufactured articles belonging to Department II of the Classification. Its size was 346 feet by 231 feet, and its cost about $55,000. These Annexes were sold by the Centennial Board of Finance, December 1, 1876, and have since been removed.

Memorial Hall.

MEMORIAL HALL AND ANNEX.—Memorial Hall (No. 101) and its Annex were used as the Art Galleries during the International Exposition, and, with the Photographic Building, contained almost all the exhibits in Department IV. It is situated on the most commanding portion of great Lansdowne plateau, on a line parallel with and northward of the Main Building. It is elevated on a terrace six feet above the general level of the plateau—the plateau itself being an eminence 116 feet above the surface of the Schuylkill river. The design of the structure is modern renaissance, and the materials granite, glass and iron. No wood having been employed in its construction, it is thoroughly fire-proof. It is 365 feet long, 210 feet wide, and 59 feet high, over a spacious basement 12 feet in height, and covers an acre and a half of ground. The centre of the structure is surmounted by a dome, 150 feet in height, constructed of iron and glass, and terminating in a colossal bell, from which rises the figure of Columbia with protecting hands. Colossal figures, typifying the four quarters of the globe, stand at the base of the dome. The main front looks southward, displaying in the centre a grand entrance, consisting of three arched doorways of uniform size; a pavilion at each end; and two arcades connecting the pavilion with the centre. The principal entrance is 70 feet wide, and displays a rise of 13 steps. Each of the three arched doorways is 40 feet in height and 15 feet in width, opening into a hall. Clusters of columns, terminating in emblematic designs illustrating Science and Art, are between the arches of the doorways. The doors are of iron, relieved by bronze panels having thereon the coats-of-arms of the various States and Territories. The coat-of-arms of the United States is in the centre of the main frieze. A balustrade, with candelabra, surmounts the main cornice, and at either end an allegorical figure represents Science and Art. The pavilions display eight windows, each 30 feet high and 12 feet wide, with stained glass and glass paintings. The arcades—a general feature in the old Roman villas, but novel in this country—are designed to screen the long walls of the gallery. Each consists of five groined arches, forming promenades looking outward over the grounds and interiorly over open gardens extending back to the main wall of the building. These garden plats are each 36 feet by 90 feet, ornamented in the centre with fountains,

Memorial Hall.

and intended for the display of statuary. From the gardens, a stairway reaches the upper line of the arcades, forming another promenade 35 feet above the ground. The balustrade is ornamented with vases, and is designed ultimately for statues. The cornices, atticas and crestings are highly ornamented. The east and west walls display the pavilions and the walls of the picture galleries, and are relieved by five niches designed for statues. The frieze is richly ornamented, and above it the central dome shows to great advantage. The rear or north front has, instead of the arcade, a series of arched windows, twelve in number, and a central door. Between the pavilions is the grand balcony—a promenade 275 feet in length and 45 feet in width, elevated 40 feet above the ground, and overlooking to the northward the whole panorama of the Park grounds. The entrances on each front of the structure open into halls, 82 feet long, 60 feet wide, and 53 feet high, decorated in modern renaissance. These, in turn, open into the central hall, 83 feet square, the ceiling rising over it 80 feet high. From the east and west sides of this central hall extend the galleries, each 98 feet long, 48 feet wide, and 35 feet high, and admitting of temporary divisions for the better display of paintings. The central hall and galleries form one grand hall, 287 feet long and 85 feet wide, capable of accommodating 8,000 persons, and having almost twice the dimensions of the largest hall in the United States. From the galleries doorways open into two smaller galleries, 89 feet long and 28 feet wide. These open north and south into private apartments, connecting with the pavilion rooms, and forming two side galleries 210 feet long. Along the entire length of the north side of the main galleries and central hall a corridor extends, 14 feet in width, opening on its north line into a series of private rooms designed for studios and smaller exhibition rooms. The galleries and the central hall are all lighted from above; the pavilions and studios from the sides. The pavilions and central hall are specially designed for the exhibition of sculpture. The building affords 75,000 square feet of wall space for painting, and 20,000 square feet of floor space for statuary, etc. The skylights are double throughout, the upper being of clear glass and the under of ground-glass. The erection of Memorial Hall was begun July 4, 1874, and finished March 1, 1876. The iron-work was furnished by the Edgemoor Iron Company, Kittredge Cornice Company, and the Pencoyd Rolling Mills; the stone-work by Sargent & Co., Westham Granite Co., Conshohocken Stone Co., S. F. Prince & Co., and Excelsior Brick Co.; and the glass by B. H. Shoemaker, Ward & Co., and J. M. Albertson. The contractor was R. J. Dobbins; the architect, H. J. Schwarzmann. Memorial Hall was built at a cost of $1,500,000, jointly contributed by the State of Pennsylvania and the City of Philadelphia. It was placed under the control of the Centennial authorities, to be used during the International Exposition as an Art Gallery, but the grand design was and is to make it a permanent receptacle of an industrial and art collection similar to the South Kensington Museum at London. As

Memorial Hall.

a specimen of accomplished architecture, Memorial Hall is by far the most ornate and imposing of all the structures erected in Fairmount Park, and when relieved from the overshadowing and dwarfing influence of the colossal proportions of the Main Building, as it ultimately will be, it will show to wondrous advantage. Both in design and execution it is worthy of the event which it was intended to commemorate—the Declaration of American Independence.

Annex to Memorial Hall.

ANNEX.—Notwithstanding the great space afforded by Memorial Hall, the numerous applications from American and foreign artists early demonstrated its incapacity for the proper display of all the works offered, and necessitated the construction of an additional building (No. 102), called the *Annex to the Art Gallery.* This structure was situated about 100 feet in the rear of Memorial Hall, and was built of brick, overcast with cement, and painted in imitation of granite. The front and side elevations were highly ornamented, the outer walls being broken by a series of arches and pilasters. It was 350 feet in length and 186 feet in width, and covered about an acre of ground. It gave 60,000 square feet of wall space available for paintings; contained 30 galleries, each 40 feet square; four galleries, each 100 feet long by 54 feet wide; and two transverse central corridors, 20 feet wide. The walls being lined with asbestos to render them fire-proof, and the structure being amply supplied with sky-lights, with interior walls 18 feet high, security, as well as a good light, was thus obtained for all the exhibits. The general appearance of this edifice, both externally and internally, harmonized well with Memorial Hall, to which it was an Annex. Its cost was about $110,000, and, at the sale held by the Centennial Board of Finance, December 1, 1876, it was sold for $3,050. It has since been removed.

Pennsylvania Educational Hall.

PENNSYLVANIA EDUCATIONAL HALL.—This building (No. 122), was situated north of Memorial Hall, and fronted on the Lansdowne Drive. It was a frame structure, octagonal in shape, and was, in size, 100 feet by 100 feet, exclusive of the two wings, which were each 40 feet by 24 feet. It contained a large assembly room and a reception room, with thirty-two alcoves, the whole being designed for the exhibition of the educational interests of the State of Pennsylvania. The building was well lighted and ventilated, and was admirably adapted for the purposes for which it was intended. The cost of the structure was about $12,000. It was sold at public auction, December 1, 1876, and has since been removed. Architects and builders, Peters & Burger.

Photographic Exhibition Building.

PHOTOGRAPHIC EXHIBITION BUILDING.—This structure (No 104), the exhibits in which were classified in Department IV of the International Exposition, was situated on the Avenue of the Republic, north of the Main Building and near the south-eastern corner of Memorial Hall. It was constructed of wood, one-story high, 242 feet long and 77 feet wide, and contained a single large chamber, with screens projecting from the side walls and forming alcoves for exhibition purposes. Ample provision was made for the hanging of pictures and for the display of photographic

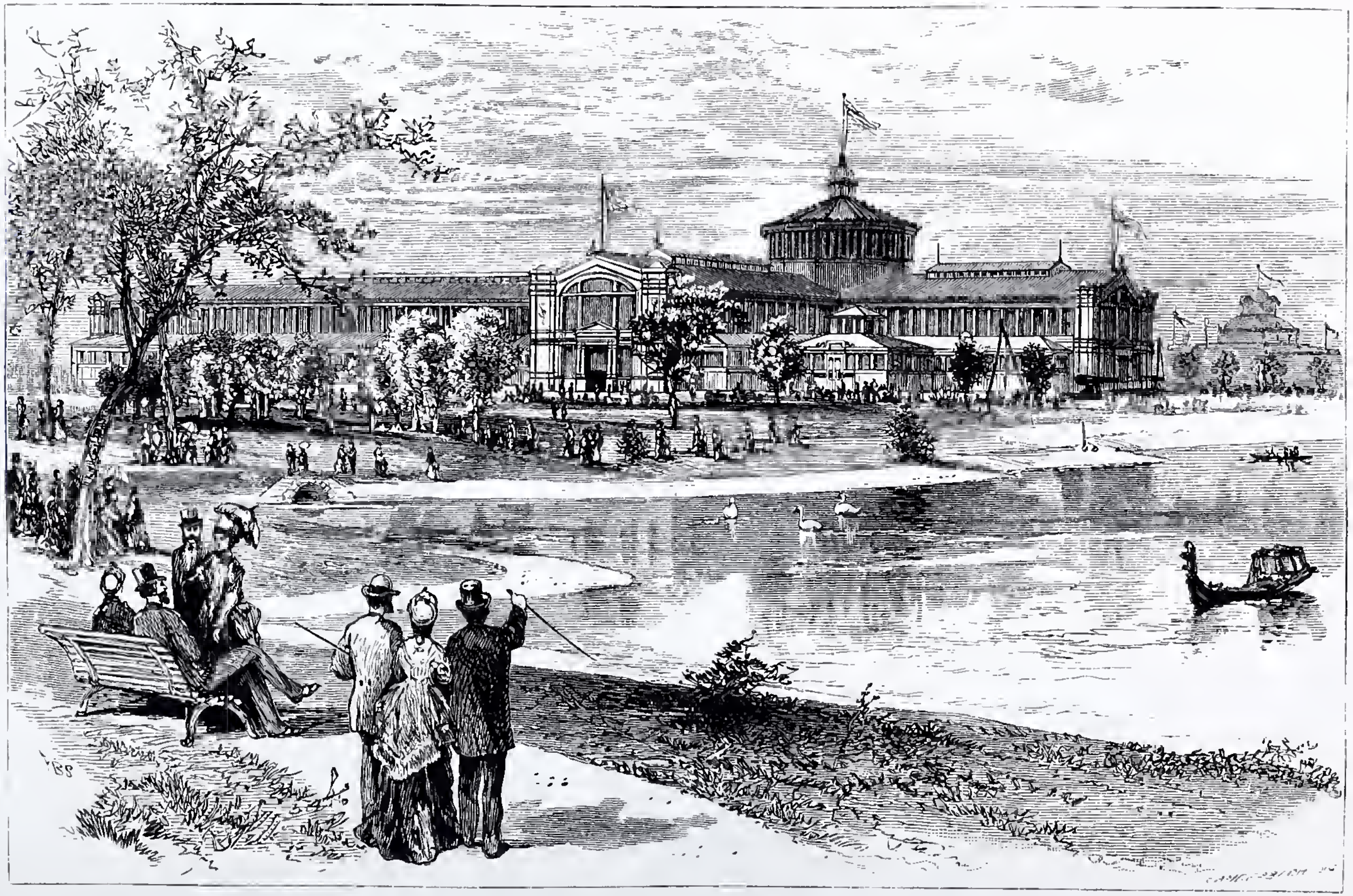
Photographic Building. appliances, an excellent light having been afforded through the glass-roof. The building had four entrances, the two at the sides being ornate and imposing. It gave 19,000 square feet of exhibition space; cost about $26,000, which was contributed by American photographers; and was devoted exclusively to the display of native and foreign photographic art. Architect, H. J. Schwarzmann.

Shoe and Leather Building. SHOE AND LEATHER BUILDING.—This building (No. 7), was constructed of wood, two stories high, and was situated on Elm Avenue, south of Machinery Hall, to which structure it was sometimes called an Annex. In size, it was 160 feet by 314 feet. The greater part of its space was appropriated to exhibits in Department II and VI, though Department V was well represented by machinery which it contained, and which illustrated various processes of manufacturing leather, shoes, etc. The cost of the building was $30,750. Architect, A. B. Barry.

Telegraphic Exhibition Building. TELEGRAPHIC EXHIBITION BUILDING.—This was a one-story frame building (No. 123), 80 feet long and 75 feet wide, located on the corner of the Avenue of the Republic and Agricultural Avenue, opposite the north-western corner of the Main Building, and fronting the Esplanade. It adjoined and directly communicated with the reception room of the Public Comfort Building on the west, and contained exhibits of all the instruments and appliances used in telegraphy. Its displays belonged to Department IV of the International Exposition. Architects, Balderston & Hutton.

United States Government Buildings. UNITED STATES GOVERNMENT BUILDINGS.—The principal structure (No. 51) was built in the form of a Latin cross, and was situated at the intersection of Belmont and Fountain avenues. It was of framed white pine, unplaned, with two tiers of windows, and had a floor-area of 102,840 square feet. It was constructed by the General Government, and contained for exhibition contributions from the various Executive Departments of the United States, with miscellaneous individual exhibits, and collections illustrative of the mineral resources of certain States of the Union. In close proximity to this structure were several other buildings expressly constructed and used for Government exhibits, viz.: the *Ordnance Laboratory Building* (No. 54), size, 53 feet by 23 feet; the *United States Army Post Hospital* (No. 52), size, 35 feet by 39 feet, with an addition of 40 feet by 14 feet; and the *Transit of Venus Buildings*, which latter consisted of: 1. The *Transit House.* Dimensions, 8 by 10 feet. 2. The *Photographic House.* Dimensions, 10 by 12 feet. 3. The *Equatorial House.* Dimensions, 11 feet in diameter. The following also belonged to the exhibits of the United States Government, viz.: *Screw Fog-Horn and Bell* (No. 59½), situated at the north-west corner of Belmont and State Avenues. This exhibit consisted of one caloric engine, which pumped air for the fog-horn; an air tank; and a stationary engine. *United States Signal Office* (No. 87), situated on State Avenue, opposite the English Government Buildings. This exhibit consisted of a field telegraphic train, with battery, wire wagons, lance trucks, a portable signal tower, and other signaling appliances.

POST 58, G. A. R.



United States Government Building.

Women's Pavilion.

WOMEN'S PAVILION.—The Women's Pavilion (No. 153) was situated on the eastern side of Belmont Avenue, nearly opposite the United States Government Building, and adjacent to the Horticultural grounds. It was built of wood, and covered an area af 26,368 square feet. It exhibited a nave and a transept, each 192 feet by 64 feet, terminating in porches 8 feet by 32 feet. Four pavilions, each 48 feet square, occupied the angles formed by the nave and transept. The centre of the structure was raised 25 feet above the exterior portions, terminating in a cupola and lantern, 90 feet in height. In addition to space for exhibits, the building contained toilet and reception rooms. The Women's Pavilion was erected at a cost of about $30,000, raised through the exertions of the women of the United States, and was exclusively devoted to the exhibition of the results of women's labor, though embracing objects belonging to all the departments of the Exposition. Painting, engraving, lithography, sculpture, literature, telegraphy, needle-work, lace-work, etc , with numerous arts, processes and implements pertaining to the economy of the household, were well represented. Architect, H. J. Schwarzmann. Contractors, Peters & Burger.

OFFICES OF THE CENTENNIAL AUTHORITIES.

Board of Finance.

CENTENNIAL BOARD OF FINANCE OFFICE (No. 8).—A one-story frame building, situated on the left hand side of the main entrance to the Exhibition grounds, and occupied by the Board of Finance for the transaction of daily business.

Centennial Commission.

CENTENNIAL COMMISSION OFFICE (No. 9).—Located on the right hand side of the main entrance to the Exhibition grounds. It was built of wood, one story high, and was used as a business office by the Centennial Commission.

CENTENNIAL COMMISSION OFFICE (No. 114).—The western wing of the Public Comfort Building. It contained offices and committee rooms, and conveniences for newspaper correspondents.

Fire Patrol.

CENTENNIAL FIRE PATROL (No. 95).—This building was situated at the corner of Belmont and State Avenues, and contained two steam fire engines and one truck.

CENTENNIAL FIRE PATROL (No. 121).—Size: (1.) 60 feet by 58 feet. (2.) 84 feet by 74 feet. The Fire Patrol was accommodated in two buildings, built of wood, one story high, containing halls for the engines, stalls for the horses, and dormitories for the firemen. The smaller house was at the north-east corner of the Main Exhibition Building, and the larger at the intersection of Lansdowne Drive and Belmont Avenue. They were supplied with steam fire engines, hose trucks, ladders, and patent fire extinguishers.

Police Stations.

CENTENNIAL POLICE STATION (No. 39).—This building was situated south-west of the Glass Factory, and was used by the Centennial Guard for quarters, etc.

CENTENNIAL POLICE STATION (No. 56½).—This building was

Police Stations.

situated immediately north of State Avenue and the Hungarian Wine Pavilion, and was used as quarters, etc., of Centennial Guards.

CENTENNIAL POLICE STATION (No. 138).—Situated at the north-east corner of Main Building, designed for the accommodation of the police, with cells for prisoners.

CENTENNIAL POLICE STATION (No. 174).—A frame building, situated east of the Hay Press and Agricultural Hall, intended for accommodation of the Centennial Guards.

Judges' Hall

JUDGES' HALL (No. 109)—Size: 152 feet by 113 feet. A two-story frame building, situated north of the Main Exhibition Building, containing ten committee rooms and four private rooms for the judges; also one large hall in the centre, and a smaller hall in the rear. It was intended for the accommodation of the International Board of Judges. The President of the Centennial Commission and the Chief of the Bureau of Awards had offices in this building.

Medical Department.

MEDICAL DEPARTMENT (No. 133).—Size: 65 feet by 32 feet 6 inches. This department was instituted for the immediate gratuitous relief of accidents and sudden cases of illness occurring within the Exhibition grounds. It was located in Lansdowne ravine, equidistant from the Main Building and Horticultural Hall, and contained two wards of three beds each, for male and female patients. An ambulance was provided for the removal of patients to their homes or to city hospitals.

Water Department.

WATER DEPARTMENT OFFICE (No. 129).—A frame building situated on Belmont Avenue, next to the Glass Magazine.

STATE AND MUNICIPAL BUILDINGS.

Arkansas Building.

ARKANSAS.—A spacious building (No. 66) on the plateau north-west of the Catholic Fountain. The structure was octagonal in shape and built in three tiers, rising one above the other, and decreasing in size as they neared the top. The highest tier was surmounted by a dome. In the construction of the building a large amount of glass was used, making it one of the coolest and most airy structures on the grounds. The exterior was colored in pale tints, relieved with dark brown, and the interior was painted white, with Howe truss arches of dark blue, supporting the roof. The entrance was on the eastern side, with the coat of arms of the State, partially surrounded by the inscription "1776—Arkansas—1876," above the doorway. A feature in the construction was the erection of projecting windows, square in shape, at each of the angles of the building. The display, which was very complete, consisted of a collective exhibit of the agricultural, mineral, timber, and other products of the State. The building, as fitted up, cost about $10,000. No action of the Legislature, beyond that of the appropriation of $15,000 was had, and the interests of the State at the Centennial were left in the hands of Messrs. George W. Lawrence and George E. Dodge (the Commissioner and Alternate), the latter being the Manager of the State Building.

California.

California.—See Pacific Coast Centennial Hall.

Colorado.

Colorado.—See Kansas and Colorado.

Connecticut Building.

Connecticut.—A small, plain-looking structure (No. 62) painted yellow, with brown stripes. Size, 30 feet by 40 feet. It was situated east of the Massachusetts Building, and the interior was finished in unstained woods. The ground plan comprised a large hall clear to the roof, with galleries, and having smaller rooms in the rear. This hall was used as a general reception room, and its distinctive feature was a large, old-fashioned fireplace, surrounded with painted tiles. Above the mantel was the gun with which General Putnam is said to have killed the wolf, and above this was a fine portrait of General Putnam himself. On the mantel was a small photograph of Governor Ingersoll, the present Governor of Connecticut. An old-fashioned clock and a sideboard of apparently equal age were exhibited, the latter bearing specimens of silverware manufactured in Connecticut. Near by was a cottage organ, also manufactured in that State. In one corner of the room was a blue banner, containing the names of all the Presidents, the letters being cut out of wood from the famous Charter Oak, and in the opposite corner was shown the royal coat of arms of Great Britain, which hung above the chair of the Speaker of the House of Representatives. In addition to these there was a section of the Charter Oak and a wooden ham and wooden nutmegs, made from the same tree. Near the fireplace was a spinning-wheel. A register was kept for visitors.

Delaware Building.

Delaware.—A very pretty structure (No. 64), just east of the Maryland Building. It was constructed in the Swiss-Gothic style; size, 54 feet by 34 feet; and it had a central turret for front elevation, and windows projecting from the roof. The exterior was colored in yellow and brown, and the interior was neatly papered in arabesque patterns. The second story was left in uncolored woods, and clear to the roof, with rooms partitioned off, and to be used by the attendants or for other purposes. On the first floor was a wide hall, on opposite sides of which were ladies' and gentlemen's reception rooms. Files of the Delaware papers were kept, with a register for visitors.

Illinois Building.

Illinois.—A small but neat-looking structure (No. 58), situated on State Avenue, north of the United States Government Buildings. Size, 60 feet by 40 feet. It had windows projecting from the roof, a turret at the side, a verandah in front, and was painted white. A large hall, running lengthwise of the building, occupied the greater portion of the ground plan. On the walls were exhibited views of Illinois public buildings, and at each end were handsome marble fireplaces. A register for Illinoisians only was kept here, and back of the hall were reception rooms for both ladies and gentlemen. The building was designed to represent a Gothic Cottage, such as thrifty Illinois farmers sometimes erect. It was commenced in April, 1876, and was ready and occupied on the 10th May following, the material having been

Illinois Building.

prepared in Chicago. The State made an appropriation of $10,000, and the building cost $8,000. The Commissioners relieved each other in attendance, one or the other being present all the time. The permanent attendants were, Gen. J. C. Smith, Secretary; Mrs. Gen. J. C. Smith, in charge of Ladies' Department; Samuel H. Smith, Clerk.

Indiana Building.

INDIANA.—This edifice (No. 57) consisted of three sections, the central portion rising above the annexes which flanked it, and having a rounded roof, with ventilator on top. It was colored in yellowish and brownish tints. The centre was occupied by a hall, from each of whose four angles small rooms had been cut off. One of these was used as a general reception room, and contained, in addition to slabs of native wood, a chair made of one hundred pieces of wood from Elkhart County. Back of this was a ladies' reception room, containing in addition to the furniture a large painting of the scenery of the Sierra Nevada and some pictures in worsted work. In the rear of the hall was a post-office and baggage room, and on the right an office, in the rear of which was a reading and press-room, with files of papers, maps, etc. The central hall rose clear to the roof, and on the walls were panels on which, in large letters, were painted statistics of the resources, population, etc., of the different counties and large towns. The entire cost of the building was about $10,000.

Iowa Building.

IOWA.—A two-story frame building (No. 98), in size, 40 feet by 53 feet, with a portico in front and bay windows on both sides, located on State Avenue between the Missouri Building and the Tennessee State Headquarters. It was colored in chocolate and drab, having the usual reception rooms for ladies and gentlemen, plainly furnished, with register for visitors, etc. In one of the rooms were exhibited some pictures in worsted work, representing Henry IV on Shrewsbury plain, a Madonna, Abraham and Hagar, and Rebecca and Rowena.

Kansas and Colorado Building.

KANSAS AND COLORADO.—The Kansas Exposition Building (No. 157), was in the form of a Maltese cross, with four office rooms at the outside intersections of the cross, which was 132 feet in length either way, with a width of 46 feet. The height of the wings to the eaves was 24 feet, and to the centre 40 feet. The building was surmounted by a dome 44 feet in height, the interior of the dome being 48 feet from floor to roof. The design of the building was by E. T. Carr, State Architect for Kansas. The structure was of wood, one-story high, with projecting windows in the roof, and was situated east of the Southern Restaurant and between Belmont and Agricultural Avenues. It was put under contract, March 16th, 1876, and was occupied, June 1st, the total appropriations being $38,625. The Kansas exhibit embraced minerals, building stone, plaster of Paris, birds and animals, silk cocoons, cotton, and a fine variety of agricultural products. Under an arrangement with the Kansas Board, the Territory (now State) of Colorado occupied one-fourth of the building, the west wing. The Colorado exhibit embraced mineral, geological, and ornithological specimens, petrifactions, views of Colorado scenery, Kansas and Colorado Building.

and the Maxwell cabinets of minerals, birds and animals of the Rocky Mountains, etc. The Atchison, Topeka and Santa Fe Railroad Company made a special exhibit in the east wing of the Kansas Building.

Maryland Building.

MARYLAND.—This building (No. 65) stood just west of that of Massachusetts, on State Avenue, and was of wood, two stories high, its size being 92 feet by 60 feet. It was modest in appearance, and the exterior was colored in light tints, relieved with red. In front of the building stood two locomotives, exhibited by the Baltimore and Ohio Railroad Company, and affording in their appearance a curious contrast. One of them was built by Phineas Davis, in 1835, and was very small and antiquated. The other was a full sized locomotive of the present day, constructed for the Company, at its works, at Mount Clare, near Baltimore, and handsomely finished. The building consisted of a large hall, with small rooms on either side. Near the centre was a collection of models of Chesapeake oyster boats, with tongs and drags used in catching oysters placed beside them. In the rear of these was a model of the fish-catching house at Druid Hill Park, Baltimore, in which thousands of black bass, California salmon and trout are hatched annually and placed in the rivers of the eastern and western shores of Maryland. Near by was a model of a shad packing-house, with wharf, boats, etc. Ranged about the hall were cabinets containing oysters found in the Chesapeake and tributary waters; a very beautiful collection of minerals, handsome marbles, sections of woods and large pieces of coal. At each end of the hall was the escutcheon of the State, and on the walls hung a number of portraits of personages prominently identified with the history of Maryland, and contributed by the Maryland Historical Society. Among these were Charles Carroll of Carrollton, Samuel Chase, Wm. Paca, Gen. Smallwood, Gen. Otho Williams, Baron DeKalb, members of the Calvert family, and others. The first room on the left was occupied as an office, and contained a register. On the walls were hung drawings from the Maryland School of Design. A figure of carved wood, painted so as closely to resemble marble, was also exhibited. In the adjoining room was a belt of wampum, made by the Indians, casts of the arms of Penn and Lord Baltimore, as cut on the boundary stones on Mason and Dixon's line, and a grant of land in Baltimore County to the Taylor family by Lord Baltimore. On the right were two rooms, one a sitting room for ladies, and the other for gentlemen, both furnished in a cool and inviting manner. In the ladies' room were hung portraits of Washington and Mrs. Washington, when both were very young.

Massachusetts Building.

MASSACHUSETTS.—This building (No. 63) was situated on State Avenue, opposite the New York State edifice, and was built of wood, and two stories high. It was one of the largest and best appointed State buildings on the grounds, its size being 85 feet by 56 feet. It consisted of one square section with Annexes at the ends, and a tower with peaked roof rising from the centre. It was colored in brown, with stripes of chrome green. The grounds were very prettily laid out, with different

Massachusetts Building.

colored flowers tastefully arranged in beds and patterns. In front of the building stood a little fountain fed by a hose. In front of the entrance was a pretty porch flanked by long piazzas, which were provided with cane-seated benches, and had baskets of flowers hanging from the roof. The entrance was made very inviting, with cages containing canary birds, baskets and pots of flowers, and two large Japanese vases beautifully decorated. The visitor first entered a cool and spacious hall, with rows of comfortable seats, and a large old-fashioned fire-place with mantel of wood. The hall also contained an organ, and a bookcase filled with standard works. The wainscoting was of unstained woods, and the rafters supporting the roof were also left unclosed. At the north end of the hall was an office with a register and post-office, and near by was a room where overcoats, parcels, etc., might be left. On the right of the entrance was the Governor's reception room, very richly furnished, with paintings on the walls, a handsome Japanese screen, and a number of other ornamental objects. On the left was the ladies' parlor, somewhat similarly furnished, and provided with a grand piano. The ceiling in both rooms was left unplastered, showing the natural colors of the woods used in the rafters and sheathing. Up stairs there were rooms which were used by the attendants.

Michigan Building.

MICHIGAN.—A pretty structure (No. 60) in the Swiss style of architecture. It was situated on State Avenue, next to the New Hampshire Building; it was, in size, 48 feet by 53 feet, and had a tower with balconies elaborately decorated in turned work. Its verandahs and projecting windows were highly ornamented. The interior was finished in raised panel-work, and displayed some fourteen distinct varieties of native woods of Michigan. The entire cost of the building was about $15,000, which, with the expense of maintaining it, was paid through private contributions. The State made an appropriation of $7,500, to be used only for collecting and exhibiting the products of its soil, mines, and forests. These were displayed in the Main Exhibition Buildings. Mr. F. W. Noble, the Secretary of the Board, had principal charge of the State Building.

Mississippi Building.

MISSISSIPPI.—This building (No. 89) was erected west of the Japanese Country House, and north of the Spanish Building. In size, it was 42 feet by 25 feet. It was unique in appearance, and afforded a striking contrast to the other structures, being built of logs, and having the long Southern hanging-moss suspended in graceful festoons from the edges of the roof. The logs were laid in three ways—horizontally, perpendicularly and diagonally, producing a very pleasing effect. In front there was a porch with rustic benches. The interior finish was of different kinds of woods varnished, embracing in all sixty-eight varieties of timber from Pike county. On one side of the hall was the office of the State Board of Centennial Managers, and on the other a reception room for ladies. A register was also kept here.

Missouri Building

MISSOURI.—A large structure (No. 70), in size, 58 feet by 48 feet, north-west of the British Building, and near George's Hill. The structure had a sharp-pointed roof, from which dormer windows projected, and on the south-east corner a tall observatory. It was painted in white with red stripes, and had a piazza extending around three sides. The larger portion of it was occupied by a cool and spacious hall, to be used as a general reception-room and exhibition hall combined. It was painted in light brown with stripings in red, and had wainscoting of different colored woods varnished. The exhibits included specimens of carving from pine scantling taken from an old church in St. Louis, and a case of minerals, a pyramid composed of pebbles and small crystals, etc. A register was kept on a stand in the centre of the room, and the walls were hung with pictures, including a view of the bridge over the Mississippi at St. Louis; a music pavilion in Forest Park, St. Louis, and a photograph of a very fine block of stores, also in St. Louis, and known as "Dr. McLean's block." Files of Missouri papers were kept, and fine specimens of ores and minerals were exhibited. In the rear of this hall were gentlemen's sitting and reading rooms, and up stairs were a reception room and a parlor for ladies. The State appropriated $5,000, which was exhausted in making, transporting, and installing her exhibits, some of which were in the main Exposition buildings. The State Building cost $4,500, and the expense of caring for the exhibits was paid through private contributions. Mr. J. L. Tracy, Secretary of the Board, had general charge.

Missouri Building.

NEVADA.—See Pacific Coast Centennial Hall.

Nevada.

NEW HAMPSHIRE.—This was a square structure (No. 61), built of wood, and in size 30 feet by 40 feet, and two stories high. It was situate on State Avenue, next to the Connecticut Building. It had a hip roof painted light yellow, relieved with stripes of green and red. In front and on the sides was a verandah. The visitor first entered a hall used as a general reception room, and from the centre of which rose a stairway of varnished woods to the second story. In this hall the register was kept, and the walls were hung with views of New Hampshire scenery.

New Hampshire Building.

NEW JERSEY.—This building (No. 155) was located at the corner of Belmont Avenue and State Street, and was of the style of architecture of the time of Queen Anne. It was begun November 1, 1875, and was finished May 20, 1876, and occupied on the 9th of the same month. The total cost of the structure was $11,000. The President, Mr. Samuel C. Brown, and the Secretary, Mr. P. T. Quinn, were in constant attendance. The State Legislature made an appropriation of $100,000 for Centennial stock, which sum was paid to the Board of Finance. In addition to this, the State appropriated $20,000 for the specific purposes of constructing the State Building, making a collective exhibit of the minerals, ores, clays, and woods of New Jersey, and aiding its manufacturers and farmers in preparing a proper representative display of their products. The State also made an appropriation of $4,000 for educational purposes. A register was kept in the State Building, in which from 600 to 700 persons daily wrote their names, the great body of whom resided in New Jersey. Ample accommodations were furnished in the line of wash-rooms, water-

New Jersey Building.

New Jersey Building.

closets, cloak and parcel rooms, and provision was made for the enjoyment of lunches which citizens brought with them, no charge being made for conveniences thus afforded.

New York Building.

NEW YORK.—This was a wooden structure (No. 74), two stories high, 60 feet by 34 feet in size, and was located on State Avenue, north of the British Buildings. Though not so expensive, it was more elaborate in appearance than some of the other State Buildings. It had a verandah extending all around it, and a small observatory on top. The exterior was colored in pale yellow and greenish-drab, with striping of red. On the left of the entrance was what is known as the public office, where conveniences for writing were offered and newspapers were kept on file. A register was kept here. On the right was a ladies' reception room, nicely furnished with cane chairs, trimmed with blue silk. In both rooms the walls were covered with pink paper, with green mouldings in one and blue mouldings in the other, producing very pretty contrasts. Up stairs was a ladies' parlor, exquisitely furnished, and a room to be used by the Governor of the State, furnished in a very expensive manner, and having on the walls several handsome paintings, together with a large portrait of Governor Tilden.

Ohio Building.

OHIO.—A building (No. 56), composed partly of wood and partly of stone. Its size is 45 feet by 44 feet, with an Annex, 60 feet by 40 feet, and it is located at the junction of State and Belmont Avenues. It was constructed of materials mainly brought from Ohio, the object being to display the various kinds of stone, wood, and other articles used in building with which that State abounds. Its height is two stories, with a high roof. The rooms on both sides of the central hall were occupied respectively as a general office, Commissioners' rooms, and ladies' parlors. In the latter were portraits of the survivors of Perry's victory on Lake Erie, framed with wood from the ship St. Lawrence. The extension in the rear was occupied as a sitting and reading room for gentlemen, and contained files of the Ohio newspapers, register, etc. After the close of the Exposition, the authorities of Ohio very generously donated the building to Philadelphia, and it will be held in permanency as one of the attractive features of Fairmount Park.

Oregon.

OREGON.—See Pacific Coast Centennial Hall.

Pacific Coast Centennial Hall.

PACIFIC COAST CENTENNIAL HALL.—This structure (No. 94) was the headquarters of the Pacific Coast States, comprising California, Nevada, Arizona, Oregon, and Washington Territory. It was erected by private citizens of California, assisted by a contribution of $1,000 from the State of Nevada. The cost of construction was about $10,000, currency, and it was commenced in the month of May, 1876, and opened on the 21st of the following June. The order of architecture was mixed, the inside being finished somewhat after the Gothic style, with pillars and arches, and having a rotunda and dome in the centre, covered with stained glass. The walls and ceilings were frescoed, with the National coat-of-arms on each side of the walls of the dome. The panels between

Pacific Coast Centennial Hall.

the pillars consisted of different kinds of hard wood, beautifully polished, from the State of California, and each pillar was ornamented at the top with the head of a grizzly bear. The coat-of-arms of California was placed over the main entrance, whilst that of Nevada was placed over the side entrance. The exterior of the building was comparatively plain, being colored in brownish tints. The following are the principal dimensions: Length, 100 feet; width, 54 feet; height, 28 feet; height of dome, 38 feet; diameter of Committee room (circular), 25 feet; height of same, 17 feet; ladies' and gentlemen's private rooms (two), 10 feet by 16 feet; private reception rooms (two), 10 feet by 12 feet. The building was located on State Avenue, opposite the British Government Buildings, and it contained a fine display of the rich and varied mineral, agricultural, and other resources of the Pacific coast. The chief management was wisely confided to Major John S. Stevenson, of San Francisco. Through him the building was, after the Exposition had closed, donated, with the understanding that it was to be re-erected on some suitable spot, and be used for the accommodation of the poor but deserving children, who, during the heat of summer, are occasionally furnished by the charitable people of Philadelphia with free excursions to the country.

Pennsylvania Building.

PENNSYLVANIA.—For particulars relative to this building (No. 55), see Preliminary Report of the Pennsylvania Board of Centennial Managers, pp. 10–23, and Final Report of the same, pp. 72–75.

Pennsylvania Educational Building.

PENNSYLVANIA EDUCATIONAL HALL (No. 122).—See Preliminary Report of the Pennsylvania Board of Centennial Managers, pp. 56–57, and Descriptive References (Vol. II), pp. 420–439.

Philadelphia Pavilion.

PHILADELPHIA.—A frame pavilion (No. 139), one story high, and in size, 88 feet by 66 feet, located on Lansdowne Drive, east of Horticultural Hall. It was erected by the Board of Finance, and was furnished by the City, for the accommodation of the Mayor and other officials connected with the municipal government. It contained a hall and parlors, and a room devoted to the use of the Fairmount Park Commission. A register was kept for visitors.

Rhode Island Building.

RHODE ISLAND.—A building (No. 99) of combined Swiss and Gothic architecture, situated on State Avenue, north of the Mississippi Building and near George's Hill. It was a small structure, and was used as a State headquarters. It was one story in height, and colored with drab tints picked out with red, with pretty cornice in elaborately turned work. The interior was finished plainly, and contained reception rooms for ladies and gentlemen, a register, etc.

Tennessee Tent.

TENNESSEE.—This State did not erect a building, but put up a large circular tent (No. 88), wherein were exhibited some fine specimens of iron ores, coals, and very pretty marbles brought from that region. A register for visitors was kept. The tent was located between the Maryland and Iowa Buildings.

Vermont Building.

VERMONT.—A small and unpretentious structure (No. 100), situated near the Turkish Bazaar and the Pennsylvania Building. It was, in size, Vermont Building.

30 feet by 40 feet, with a French roof. The exterior coloring was a pearl gray, with the coat-of-arms of Vermont and the name of "Vermont" in gold letters above the doorway. A small hall was flanked on either side by a neatly furnished ladies' parlor, with a piano, and a pleasant sitting-room for gentlemen. In the rear of this hall was a reading-room, with boot-blacking stand, files of newspapers, etc. It was proposed at one time to erect an Annex, in which to exhibit the very rich marbles of Vermont, but that idea was abandoned. Vermont made no appropriation for Centennial purposes, and the State Building was the gift of Hon. N. T. Sprague, Jr., of Brandon. The cost of furniture and maintenance were met by private subscriptions. The management was confided to Mr. Joseph S. Patterson, with Mr. Mord M. Ellis as assistant, the superintendence being given gratuitously. Since the Exposition closed, the building has been re-erected near the Mineral Springs at Bedford, Pa., where it retains all its original outward characteristics, even to the shield and number above the door.

Virginia Building.

VIRGINIA.—A small frame structure (No. 177), one story high, with a verandah all around, situated east of the Kansas and Colorado Building, facing the Horticultural grounds. A register was kept for visitors. The establishment was built and maintained at private expense, Virginia having made no appropriation for Centennial purposes.

Washington Ter.

WASHINGTON TERRITORY.—See Pacific Coast Centennial Hall.

West Virginia Building.

WEST VIRGINIA.—On the 10th December, 1875, this State made an appropriation of $20,000, which was immediately available for the purposes of a collective exhibit of its resources. Its building (No. 68) was situate north-west of the Catholic Total Abstinence Fountain, and was, in size, 115 feet by 40 feet. It was built entirely of West Virginia woods, and all of its parts were fitted up near Wheeling and brought to the Centennial grounds to be erected. Nine varieties of wood entered into its construction. The hall, office, reading room, water closets, etc., were on the ground floor. The parlor, ladies' private rooms, etc., were on the second floor, with a balcony looking down into the hall below. The rooms were each 20 feet by 20 feet. The rooms were tastefully furnished, and the parlor contained a piano. Attached to the rear of the building was an exhibition hall, 40 feet by 60 feet, wherein the natural resources of the State were shown. Above the entrance were grouped enormous stalks of white and yellow corn, interspersed with wisps of hay and straw. Ranged about the walls were tall graduated columns made of sections of trees, laid perpendicularly and fastened against the wall so as to show the grain of the wood. There was a great variety of these specimens, showing the timber production of the State to be particularly rich. Blocks of coal and iron and copper ores were exhibited in profusion, together with specimens of petroleum, wines, agricultural products, limestones, marble, woodwork in axe helves, crockery manufactured at Wheeling, potter's clay, black flint, fire clay, yellow ochre, mill-stone rock, etc. The public schools of the State were represented by various specimens of the work of the pupils and text books. There were also shown a geological map of Brooke county, maps of the State, and a map for the blind, prepared by H. H. Johnson, Teacher in the West Virginia Institute for the Blind and for the Deaf and Dumb. The contract price for both structures was $6,000. The work was commenced, February 21, 1876, and finished about the first of the following May. The Director in charge was Professor M. F. Maury, of the University of Virginia. West Virginia Building.

WISCONSIN.—This State appropriated $20,000 for Centennial purposes, and erected a building (No. 59), for the accommodation of its Commissioners, the location being on State Avenue, north of the United States Government Buildings, and the size 50 feet by 49 feet. The cost of the structure was about $4,000. It was neatly finished in brown tints, with a piazza in front. On the left of the hall were two ladies' parlors, handsomely furnished, and on the right a general reception and large reading room for gentlemen. The walls of these rooms were hung with portraits of notable persons. The establishment was under the immediate superintendence of Mr. Elisha Starr. Wisconsin Building.

FOREIGN BUILDINGS.

BETHLEHEM BAZAAR (No. 58½).—A wooden structure, located on Fountain Avenue, adjoining the Jerusalem Bazaar, and intended for the sale of olive wood. Bethlehem Bazaar.

BRAZILIAN EMPIRE PAVILION (No. 115).—This structure was of wood, situated on Lansdowne Drive, adjoining the German Government Building, and intended for the use of the Brazilian Commission. Brazilian Pavilion.

BRITISH GOVERNMENT BUILDINGS (Nos. 71, 72, 73).—Size, No. 1, 5,000 sup. feet; No. 2, 1,200 sup. feet. These edifices were erected for the use of the Royal Commission. The large one was the residence of the Commissioners and Delegates, while the smaller furnished accommodations for the members of the staff. They are built in a picturesque, half-timbered style, essentially English, and are located north of Machinery Hall. A bake-house and laundry are attached to them. British Government Building.

Shortly after the close of the Exposition, these buildings were donated to the City of Philadelphia. On the 22d November, 1876, Councils adopted the following preamble and resolution, accepting the gift: Donated to Philadelphia.

Whereas, The Government of Great Britain having, by his Grace the Duke of Richmond and Gordon, presented to the City of Philadelphia the buildings erected in Fairmount Park for the use of the commission during the International Exhibition, known as St. George's House, it is hereby Resolutions.

Resolved, By the Select and Common Councils of the City of Philadelphia, That the same be accepted as an expression of good will and kindly feeling to the municipality, and that the buildings be carefully preserved as a memorial of the broad and liberal spirit which prompted the gift, and as an enduring monument of the auspicious part taken in the International Exhibition, Philadelphia, 1876, by the United Kingdom of Great Britain and Ireland, the Dominion of Canada and British Colonies, and the Empire of India.

The following resolution of request was also adopted:

British Government Building.

Resolved, By the Select and Common Councils of the city of Philadelphia, That his honor, the Mayor, be and is hereby requested to have the resolution of thanks to her Britannic Majesty's Government properly engrossed and forwarded through Colonel Herbert Bruce Sanford, R. A., British Executive Commissioner, to the Duke of Richmond and Gordon, K. G., lord president of the Council, and that the thanks of the Select and Common Councils of the City of Philadelphia be and are hereby also tendered Colonel Sanford for the good will shown by him toward the City in this transaction.

Canadian Log House.

CANADIAN LOG HOUSE (No. 69).—Size, 75 feet by 56 feet, and intended for the use of the Canadian Commission. It was one story high, constructed of logs, and located close by the British Government Buildings. It constituted an exhibit of the timbers of Canada.

Lienard's Georama.

COLONEL LIENARD'S GEORAMA (No. 75).—Designer, Col. Lienard, Paris.—Size, area 1,250 square feet. An open-air exhibit, models of the cities of Paris and Jerusalem, in gypsum. The contour of the ground was shown, and the streets were fully delineated. It was in the centre of Fountain Avenue, at the head of the principal lake.

French Glass Exhibit.

FRENCH GLASS EXHIBIT (No. 136).—R. De Bergne. This building was constructed entirely of glass, and situated on Lansdowne Drive, adjoining the Moorish Villa. It was designed to show window glass, tiles, marble, onyx, etc.

French Pavilion.

FRENCH GOVERNMENT PAVILION (No. 120).—Size, 100 feet by 50 feet. Constructed of brick and iron, and exhibiting models in relief and designs of all the public works of France executed during the last few years; also a collection of books and publications relative thereto. It was situated west of the Art Gallery, on Lansdowne Drive.

German Pavilion.

GERMAN EMPIRE PAVILION (No. 112).—Size, 83 feet by 33 feet. Constructed of stone, one story high, furnishing accommodations for the Imperial Commissioners as well as German visitors. It is located on Lansdowne Drive, between Belmont and Agricultural Avenues, and will remain in permanency in Fairmount Park, the German Empire having donated it to the City of Philadelphia.

Hungarian Wine Pavilion.

HUNGARIAN WINE PAVILION (No. 55½).—This structure was circular in form, situated on State Avenue, north of the Japanese and Mississippi Buildings, and was devoted to the sale of Hungarian wines exclusively. Jacob Kohn, Manager.

Japanese Bazaar.

JAPANESE BAZAAR (No. 108).—Situated on Lansdowne Drive, immediately north of the Department of Public Comfort, and designed for the sale of Japanese wares. This structure will remain, the Japanese merchants having presented it to Philadelphia.

Japanese Dwelling.

JAPANESE DWELLING (No. 67).—Size, 102 feet by 48 feet. This building, usually called the Japanese Government Building, was used as a dwelling-house for Japanese workmen. The wood and other articles that entered into its composition, and also the vases and flowers in the surrounding garden, were imported from Japan, and all the work was done by Japanese artisans. It was situated south of the British Buildings.

Jerusalem Bazaar.

JERUSALEM BAZAAR (No. 53½).—Situated on the south side of Fountain Avenue, and due north of the Turkish Bazaar. Designed for sale of olive wood.

Moorish Villa.

MOORISH VILLA (No. 126).—Constructed in Morocco by native workmen; exhibited by Dr. Max Schmidl, for the display of native products and fancy articles; conducted by Abd el Kader ben Katib. It was situated on Lansdowne Drive, opposite the Sheet Metal Pavilion.

Portuguese Building.

PORTUGUESE GOVERNMENT BUILDING (No. 134).—Size, 55 feet by 51 feet. A one-story wooden structure, with cupola, located on the north-east corner of Agricultural Avenue and Lansdowne Drive, and used to accommodate Commissioners and visitors from Portugal.

Spanish Buildings.

SPANISH EXHIBITION BUILDING (No. 86½).—Size, 80 feet by 100 feet. Constructed of wood, in a style similar to Machinery Hall; adjacent to the Spanish Engineers' Pavilion.

SPANISH GOVERNMENT BUILDING (No. 86).—A one-story frame building, decagonal, 50 feet in diameter, situated on the Avenue of the Republic, west of the Catholic Total Abstinence Fountain. It was used as the headquarters of the Spanish soldiers.

Sponge Fishers of Turkey.

SPONGE FISHERS OF TURKEY (No. 57½).—This building contained an exhibit of sponge and fruit, and was situated on the south side of Fountain Avenue, and north of the Vermont State Building and Turkish Café.

Swedish Buildings.

SWEDISH SCHOOL-HOUSE (No. 107).—Size, 40 feet by 50 feet. Situated in the Swedish Government grounds, north of the Main Exhibition Building. A one-story frame house, containing school-rooms and the interior arrangements of a Swedish school-house. The framework for the building was imported from Sweden, and was on exhibition by G. O. Wengstion of Stockholm. METEOROGRAPH.—A one-story, latticed structure, east of the Swedish school-house, surmounted by semi-globular cups, connected with apparatus in the interior, showing the velocity of the wind.

Tunisian Café.

TUNISIAN CAFÉ AND BAZAAR (No. 79.)—A decorated pavilion with stained glass windows, designed for the display of Tunisian products. Situated on Fountain Avenue, north of the Pennsylvania State Building.

Turkish Café.

TURKISH CAFÉ (No. 96).—Size, 51 feet by 65 feet.—An octagonal frame building, with a coffee-room, parlors, and bazaars, situated on a walk between Fountain Avenue and the Avenue of the Republic, near their junction north of Machinery Hall. It was the headquarters of the Turkish Commission.

SPECIAL EXHIBITION BUILDINGS AND OUT-DOOR EXHIBITS.

American Fusee Co.

AMERICAN FUSEE COMPANY'S BUILDING (No. 124).—W. R. Davenport, New York. Size, 14 feet by 14 feet. Situated on Lansdowne Drive, north of the Judges' Building.

Automatic Railroad.

AUTOMATIC RAILROAD (No. 23).—Charles W. Hunt, New York. Size, 20 feet by 150 feet. Illustrations of the mode of unloading vessels by

Automatic Railroad.

means of a railroad worked by a self-acting apparatus. It was situated west of Machinery Hall.

Averill Paint Company's Building.

AVERILL CHEMICAL PAINT CO. (No. 40).—Size, 36 feet by 42 feet. Contained exhibits of the Averill Chemical Paint ready for use, and applied. The building was constructed on the Rogers patent, had no frame work, and was put together with bolts and iron tongues. It was west of the Liberty Stove Works, on Fountain Avenue.

Burial Casket Building.

BURIAL CASKET BUILDING (No. 141).—Schuyler & Armstrong and S. Stein, Proprietors. The exhibit consisted of various designs of funeral caskets, shrouds, etc. It was a one-story frame house with turrets, and was situated on Lansdowne Drive near the bridge, and north of Art Gallery Annex.

Car House.

CAR HOUSE (No. 38).—Size, 140 feet by 44 feet. Situated west of Machinery Hall, on line of Narrow-Guage Railroad; designed for the exhibition of cars.

Photographic Building.

CENTENNIAL PHOTOGRAPHIC ASSOCIATION BUILDING (No. 110).—Size, 150 feet by 30 feet. A one-story frame building, located north of the Main Exhibition Building, on the east side of Belmont Avenue. It contained one room for the exhibition of photographs, and three rooms for photographers for working purposes.

Chilian Building.

CHILIAN AMALGAMATING MACHINERY (No. 35).—Commission for Chili. Contained working models of amalgamating machinery used in working ores, and had a boiler-house with small cylinder boilers. It was situated west of Machinery Hall.

Cuban Garden.

CUBAN ACCLIMATION GARDEN OFFICE (No. 144).—Manager, Jules Laehaume. Size, 12 feet by 25 feet. This structure was designed to show tropical produce, seeds, vegetable physiology, and rustic work, and was situated directly south of Horticultural Hall.

Water-Proof Pavilion.

EHRET'S WATER-PROOF ROOFING (No. 43).—M. Ehret, Jr., Philad'a, Pa. A circular pavilion, showing fire and water-proof roofing. It was located to the east of the central southern entrance of the Main Building.

Empire Transportation Co.

EMPIRE TRANSPORTATION COMPANY'S BUILDING (No. 119).—Size, 70 feet by 60 feet. This structure was located north of the eastern end of the Main Building, and exhibited by models the method of transportation used by the Empire Transportation Company and its auxiliaries in the United States.

Fire-Proof Building.

FIRE-PROOF VENTILATED BUILDING (No. 47).—Architect and builder, Robert Irwest. Size, 13 feet by 13 feet. This was a one-story building composed of hollow bricks, peculiar in construction. Located south of Main Building and Annex No. 2.

Friction Drum.

FRICTION DRUM (No. 33).—I. S. Mundy, Newark, N. J. Situated west of gas machine, near Elm Avenue, and consisted of an improved portable friction drum.

Kindergarten.

FROBEL'S KINDERGARTEN (No. 154).—Size, 45 feet by 18 feet. Situated north-east of Women's Pavilion. Contained specimens of school work, and illustrated the operation of kindergarten teaching.

Stove Building.

Fuller, Warren & Co.'s Stove Building (No. 14).—Size, 60 feet by 45 feet. Located at the east end of Machinery Hall, and facing the Fountain of the Catholic Total Abstinence Society. It contained samples of stoves, heaters, and ranges in operation; was built of wood, one-story high, and surmounted by a cupola.

Glassware Building.

Gillender & Sons' Glassware Building (No. 15).—A one-story frame house, situated west of Machinery Hall, on the walk to the Fifty-second Street entrance, where glass in process of manufacture was shown.

Glass Magazine.

Glass Magazine (No. 125).—Size, 40 feet by 40 feet. Klautsheck, Thomas & Stuart, Philadelphia. This magazine was erected adjoining the Photographic Association Building, opposite the lake. It was constructed mainly of glass from the factories of the above firm, and contained a full assortment of plate and window glass, and glass shades for the accommodation of exhibitors; it was two stories high, and connected by a bridge with Belmont Avenue.

Gunpowder Pile Driver.

Gunpowder Pile Driver (No. 25).—Size, 35 feet by 12 feet. Gunpowder Pile Driving Co., Philadelphia. This was built in the open air to exhibit the operation of pile-driving by means of gunpowder. It was situated south-west of Machinery Hall, between it and the barrier.

Hay Press.

Hay Press (No. 173).—Size, 48 feet front; wings, 12 by 20 and 12 by 24. P. K. Dedrick & Co., Albany, N. Y. One Dedrick portable engine, six horse-power, for running hay presses. These presses take in loose hay, baling and handling 20 tons to the hour, or 280 bales.

Swings.

Hewitt & Brennan's Swings (No. 48).—These swings are known as aerial chairs, and are operated by means of a treadle with foot-pressure, leaving the hand entirely free. They numbered six, and were situated on Agricultural Avenue, immediately south of the American Restaurant, and south of Main Building, where the exhibit was known as aerial chairs.

House Apiary.

House Apiary (No. 168).—Size, 10 feet by 16 feet. J. S. Coe, Montclair, N. J. This was an exhibit of thirty-two colonies of Italian, Corinthian, and Cyprian bees at work making honey. Situated east of the Pomological Building.

Iron Pipe.

Iron Pipe (No. 17).—Andrew O'Neill, Ansonia, Conn. This was an outdoor exhibit, situated south of Machinery Hall, and consisted of water and gas pipes, showing patent process of jointing.

Kindergarten.

Kindergarten (No. 137).—Located north of Carriage Annex on Lansdowne Drive, and designed to show object teaching. It was a wooden structure, one story high.

Stove Works.

Liberty Stove Works (No. 18).—Size, 45 feet by 34 feet. Charles Noble & Co., Philadelphia. A one-story frame building, located west of Machinery Hall, and south of the Catholic Total Abstinence Fountain, on Fountain Avenue; containing different varieties of heaters, stoves, and ranges, manufactured by Noble & Co.

Quartz Mill.

Nevada Quartz Mill (No. 31).—Size, 60 feet by 43 feet. State of Nevada. Exhibited the process of manipulating ores and precious metals. It was a one-story frame building, situated south of Machinery Hall.

Old Cars, etc.

Old Locomotive and Cars (No. 37).—Exhibited by Pennsylvania Railroad Co. This exhibit was situated on the line of the Narrow-Guage Railroad, west of Machinery Hall, and consisted of the engine "John Bull," with tender and two passenger cars, standing upon the rails and stone sleepers of the first piece of track laid for the Camden and Amboy Railroad, in 1831; also, the first iron prow used on ships in crossing the Atlantic Ocean.

Guano Pavilion.

Pacific Guano Company's Pavilion, (No. 169)—John M. Gliddon, Manager. This was, in style, similar to a Moorish kiosk. The exhibit consisted of various products of the soil, guano in its various processes of manufacture, models of company's works at Wood's Hole and Chisolius Island, fossil remains, etc., while several acres of ground, in close proximity to their pavilion, were planted in cotton, cane, tobacco, etc., to demonstrate the efficacy of their manufacture. The building was situated on Fountain Avenue, east of the Women's Pavilion.

Railroad Crossing.

Patent Railroad Crossing (No. 30).—This exhibit was located on the line of the Narrow-Gauge Road, near Elm Avenue, and west of Machinery Hall. It was designed to keep dirt from accumulating between the rails and planks of the crossing.

Perforated Metals.

Perforated Metals (No. 142).—This was a one-story brick building with skylight, located between the Carriage Annex and Lansdowne Drive, and designed to show the practicability of using perforated window blinds in dwellings.

Pneumatic Tubes.

Pneumatic Tubes (No. 28).—A. Brisbane. These tubes were placed on a platform, showing the process of transmitting messages and packages by this method. The exhibit was situated west of the gas machine, near the fence on Elm Avenue.

Pressed Fuel Pavilion.

Pressed Fuel Company's Building (No. 85).—Polygon, 24 feet in diameter. E. F. Loisean, Philadelphia. Constructed of iron and situated in a garden plot on the Avenue of the Republic, west of the lake and opposite to Machinery Hall. It exhibited the fuel in a state of combustion, to demonstrate its economy and adaptability.

Fire Apparatus.

The Protective Fire Apparatus Company of New York (No. 178).—Size, 8 feet by 10 feet. This was a one-story wooden building, situated on Agricultural Avenue, west of Agricultural Hall, and was designed to display fire extinguishers.

Railroad Engine House.

Railroad Engine House (No. 21).—This building was used for storing and repairing the engines of the Narrow-Gauge Railroad Company, and was located west of Machinery Hall.

Rubber Roofing.

Rubber Roofing (No. 143).—This building was situated on Lansdowne Drive, between the Carriage Annex and Pennsylvania Educational Hall. It was octagonal in shape, and surmounted by a tower ten feet high. The exhibit consisted of rubber roofing.

Elevated Railway.

Safety Elevated Railway (No. 175).—Roy Stone, Proprietor. This railroad was situated over Belmont ravine, north of Horticultural Hall. It was designed by Roy Stone, and first erected at Phœnixville, Pa. It was brought here as an exhibit and for conveyance of passengers under the concession to the West End Railroad Co. It is intended for rapid transit in cities, or for very cheap country railroads for passengers and freight.

Elevated Railway.

SINGER SEWING MACHINE BUILDING (No. 132).—Size, 81 feet by 56 feet. It contained an exhibit of every style of machine manufactured by the Singer Manufacturing Company, and samples of work. It was constructed of wood, and was located on Lansdowne Drive, north of the Art Gallery.

Singer Sewing Machine Building.

SHEET METAL PAVILION (No. 111).—Size, 22 feet by 40 feet. Situated on Lansdowne Drive and Belmont Avenue, opposite the lake. Marshall Bros. & Co., Girard Avenue below Front Street, Philadelphia, Pa., exhibited the utilization of galvanized and leaded sheets in the construction of this building. American polished, cleaned, and refined sheets, galvanized cemetery and house work, and corrugated iron. The building itself was a specimen of the workmanship of the Kittredge Cornice and Ornament Co., Salem, O., and illustrated the application of sheet metal to architectural purposes.

Sheet Metal Pavilion.

STARR'S IRON WORKS (No. 26).—Jesse W. Starr & Son, Camden, N. J. The space allotted to this firm was occupied with gas works, pipes, special castings, stop-valves, lamp-posts, and fire hydrants, located south-west of Machinery Hall, close to the barrier.

Starr's Iron Works.

ST. CECILIAN ORGANS (No. 22).—T. C. Knauff, Philadelphia, Pa. This exhibit consisted of miniature organs, and some clocks made in 1676, 1776, and 1876. The building was frame, one story high, and in design resembled an organ. It was situated south of Mineral Annex, No. 1, near the eastern entrance to the Main Building.

Organs.

TEA AND COFFEE PRESS EXTRACT BUILDING (No. 161).—Size, 100 feet by 45 feet. A two-story frame building, composed of four observatories connected by verandas. Located opposite the south-east corner of the Agricultural Building, and devoted to the exhibition of the process of making coffee, tea, and other extracts, by means of pressure caused by the expansion of the materials used.

Press Extract Building.

TERRA-COTTA PIPES (No. 45).—Exhibited by E. W. Rittenhouse & Bro., Baltimore, Md. Comprised drain pipes of different sizes, elbows, angles, etc. Located south-west of Machinery Hall, and adjoining the Gas Machine.

Terra-Cotta Pipes.

U. S. HOISTING MACHINE (No. 34).—Stokes & Parrish. This exhibit adjoined the machine shop of Stokes & Parrish, south of Machinery Hall, and consisted of a derrick with engine and boiler attachment.

Hoisting Machine.

WEIMER'S MACHINE WORKS, LEBANON, PA. (No. 11).—This outdoor exhibit was located south of Machinery Hall, between the Shoe and Leather Building and the Stokes & Parrish Machine Shop, and consisted of bells, car dumps, carts for coal, iron bars, and steel coil tuyere.

Weimer's Machine Works.

Windmills.

WINDMILLS (No. 171).—1, Eclipse Windmill Co., Beloit, Wis.—Three windmills for pumping water, grinding, etc. 2, U. S. Wind Engine and Pump Co., Batavia, Ill.—Two windmills. 3, Stover Wind Engine Co., Greencastle, Pa.—One windmill. 4, Hartford Pump Co., Hartford, Conn.—One windmill for raising water by compressed air.

Bank and Bankers' Buildings.

Bankers' Pavilion.

BANKERS' EXHIBIT (No. 135).—Size, 69 feet by 41 feet. Erected by the banks, bank officers, and bankers of the country for the exhibition of coins and currency. It was located east of the Art Gallery, and between the Photographic Gallery and the Vienna Bakery.

Centennial National Bank.

CENTENNIAL NATIONAL BANK (No. 10).—Size, 72 feet by 40 feet. Situated at the south-west corner of the Main Exhibition Building, and east of the Centennial Commission Office. It was one story high, built of wood, and was the medium for transacting the financial affairs of the Exhibition.

Railroad Offices.

Pennsylvania Railroad Office.

PENNSYLVANIA RAILROAD OFFICE (No. 113).—Octagon, 75 feet in diameter. A two-story frame building situated on the north-east corner of Belmont Avenue and the Avenue of the Republic, adjoining the Judges' Hall. It was designed for the general ticket office of the four great trunk lines, viz.: New York Central, Erie, Baltimore & Ohio, and Pennsylvania Railroads. Tickets were sold to all points, and information was furnished regarding routes of travel.

West End Railway Office.

WEST END RAILWAY OFFICE (No. 27).—This was a two-story frame building, situated west of Machinery Hall and north of the Railroad engine house, on the line of the Narrow-Gauge Road, and designed for the transaction of the Company's business.

Catalogue, Newspaper, and Publishing Buildings.

American Bible Society Pavilion.

AMERICAN BIBLE SOCIETY PAVILION (No. 127.)—Size, 17 feet by 23 feet. Located near Lansdowne valley south of Horticultural Hall, close to the bridge; oval in shape, and surmounted by a carved roof with a projecting cornice. It bore the inscription, "The Bible without note or comment." In front was an open Bible, and over it the text from Jeremiah xxii, 29: "O earth, earth, earth, hear the word of the Lord." Only Bibles and Testaments were sold.

American Newspaper Building.

AMERICAN NEWSPAPER EXHIBITION (No. 93).—Size, 70 feet by 46 feet.—A two-story frame structure of Swiss architecture, on Fountain Avenue, near the lake. It contained a large hall, and a reading-room supplied with newspapers from all parts of the United States. In April, 1876, the United States published regularly 8,129 newspapers, a number exceeding the combined issues of all the other nations of the earth. Regular files of most of these newspapers, and sample copies of all, were alphabetically arranged for exhibition, with a printed catalogue of the whole. Messrs. George P. Rowell & Co., No. 41 Park Row, New York, had charge of the establishment.

Boston "Daily Advertiser" and Boston "Herald" (No. 92). Size, 29 feet by 16 feet. A one-story frame building, situated on Fountain Avenue opposite north-west corner of Machinery Hall; used as the headquarters of the correspondents and attaches of the newspapers erecting it.

Boston "Advertiser" and "Herald" Building.

Campbell Printing Press Building (No. 36).—Size, 88 feet by 144 feet. The various printing presses manufactured by this company were exhibited in operation; the power furnished by a thirty (30) horse-power engine and boiler. Specimens of type printing from the date of the invention, and of sunlight printing, were shown, and a complete printing office, of the fashion of 1776, was also in operation.

Campbell Printing Press Building.

Frank Leslie's Pavilion (No. 97).—This building was situated at the eastern end of the lake, on Belmont Avenue, adjoining the office of Cook, Son & Jenkins. It was octagonal in shape, Moorish in design, and highly ornamented. It was used as an office of Frank Leslie's publications.

Frank Leslie's Pavilion.

New York "Tribune" Building (No. 83).—Size, 30 feet by 21 feet. A small octagonal wooden building, with verandas and a high tower-like roof. It was located close to the French Restaurant and the lake, and was used as an office for the correspondents and reporters of "The Tribune."

New York "Tribune" Building.

Official Catalogue and Newspaper Advertising Office (No 41).—Size, 20 feet by 30 feet. A one-story building, occupied jointly by the Centennial Catalogue Company, and S. M. Pettengill & Co., Newspaper Advertising Agents. It contained bound volumes and files of the principal newspapers of the country, specimen numbers of old newspapers, photographs of editors and publishers, etc., and was situated south of the east end of Machinery Hall.

Official Catalogue Building.

Philadelphia "Times" Pavilion (No. 54½).—Size, 28 feet by 17 feet. The Centennial business office of the "Times," a daily paper, issued morning and evening, and printed on a Hoe perfecting press in Machinery Hall. It was a one-story frame building, located on Belmont Avenue, opposite and east of the lake.

Philadelphia "Times" Building.

"Practical Farmer" (Newspaper) Headquarters (No. 172).—Size, 10 feet by 16 feet. Situated east of the Pomological Building. Office of the paper.

"Practical Farmer" Building.

Places of Refreshment.

American Restaurant (No. 159).—Size, 300 feet by 200 feet. Tobiason & Heilbrun, Philadelphia. Situated between Agricultural and Horticultural Halls. The seating capacity was five thousand. The banquet room accommodated six hundred guests. The waiters spoke various languages. There was a pavilion devoted to ice cream, etc. A bill of fare was served either *a la carte* or *table d'hote.*

American Restaurant.

Cigar Stands

Cigar Stands (No. 77).—Located at various points north of the Avenue of the Republic, and west of Belmont Avenue. Cigar Stands (No. 151). Situated at various points east of Belmont Avenue and south of Fountain Avenue. Cigar Stands (No. 164).—Located at various points east of Belmont and north of Fountain Avenues.

Dairy Building.

Dairy Association Building (No 116).—Size, 77 feet by 25 feet; pavilion, 80 feet by 30 feet. Situated on the north side of Lansdowne valley, south-west of Horticultural Hall. It was a two-story rustic building and the surrounding grounds were laid out as a garden, in which was a pavilion for the additional accommodation of visitors.

Department of Public Comfort.

Department of Public Comfort (No. 118).—Size, 264 feet by 112 feet. Department of Public Comfort Company, Limited. W. Marsh Kasson, Chairman, Philadelphia. Located on the corner of the Avenue of the Republic and Agricultural Avenue, opposite the north-western corner of the Main Exhibition Building, and fronting the Esplanade. It was a two-story frame building, containing a reception room and ladies' parlor, free to all; barber shop, coat and baggage room, lunch counter, and lavatories. Tickets for places of amusement were on sale, and a daily register of all visitors was kept. The western section of the building was occupied by the President of the Centennial Commission. Office desk room was afforded to exhibitors. The centre portion of the building was surmounted with an open-air gallery, giving a view of the grounds.

Drinking Fountains.

Drinking Fountains (No. 81).—The drinking fountain, erected by the Sons of Temperance of Pennsylvania, was built of wood, the structure inclosing it being circular in form, and it was situated at the junction of Fountain and Belmont Avenues. The Singer & Talcott drinking fountain was a marble fountain, situated between the Bethlehem Bazaar and Tunisian Café.

George's Hill Restaurant.

George's Hill Restaurant (No. 90).—Size, 112 feet by 72 feet. Talman & Kohn, Philadelphia. Located in the western portion of the grounds, on George's Hill, in the vicinity of the State buildings. It was a one-story structure, built of wood, and was also called the Hebrew Restaurant.

German Restaurant.

German Restaurant (No. 160).—Size, 200 feet by 150 feet. Philip J. Lauber, Philadelphia. Contained three acres for garden arrangements, and was situated north of Horticultural Hall, on Lansdowne Drive.

Restaurant Lafayette.

Restaurant Lafayette (No. 117).—Size, 130 feet by 30 feet. This was a two-story wooden building, located north-west of the Art Gallery, between Lansdowne Drive and the brook. It was conducted on the French plan.

South Restaurant.

"South" Restaurant (No. 156).—Size, 182 feet by 92 feet. E. Mercer, Atlanta, Ga. It was situated on the north-west corner of State and Belmont Avenues, and was a two-story frame building.

New England Kitchen.

New England Farmer's Home and Modern Kitchen (No. 158).—Size, 49 feet by 35 feet. Miss E. B. Southwick, Boston. A representation of a New England farmer's home 100 years ago, combined with a modern kitchen, thus illustrating 1776 and 1876. It was one story high, and situated on the corner of State and Agricultural Avenues. It is now in the Main Building as an exhibit. New England Kitchen.

POP-CORN BUILDINGS (No. 76).—Size, 41 feet by 32 feet each. J. A. Baker, Dayton, Ohio. One of these buildings was situated on Fountain Avenue, opposite the northern extremity of the lake; the other was on Agricultural Avenue, east of and opposite the New England Farmer's Home and Modern Kitchen. They were devoted exclusively to the sale of pop-corn, and were built of wood, one story high. POP-CORN STAND (No. 179).—Situated at corner of Agricultural Avenue, near station of Narrow-Gauge Railroad. Pop Corn Buildings.

SODA WATER STANDS (No. 78).—These stands were situated at various points north of the Avenue of the Republic, and west of Belmont Avenue. SODA WATER STANDS (No. 130).—These were located at various points east of Belmont Avenue and south of Fountain Avenue. SODA WATER STANDS (No. 163).—These were located at various points east of Belmont and north of Fountain Avenues. Soda Water Stands.

"TROIS FRÉRES PROVENCAUX" RESTAURANT (No. 82).—Size, 177 feet by 110 feet. Louis Goyard, proprietor. A two-story frame structure, situated on the corner of Belmont and Fountain Avenues. It had large garden surroundings, and was a duplicate of the restaurant of the same name in Paris as regards its management. French Restaurant.

VIENNA BAKERY, OR COMPRESSED YEAST BUILDING (No. 105).—Size, 146 feet by 105 feet. Gaff, Fleischmann & Co., Blissville, Long Island, N. Y. Designed to exhibit the advantages of using compound yeast in baking. It also contained a coffee-house. Vienna Bakery.

MONUMENTS, FOUNTAINS, STATUARY, ETC.

AMERICAN SOLDIER (No. 24).—Exhibitors, New England Granite Company, Hartford, Conn. A granite statue, designed for the Antietam Soldiers' Monument; is twenty-one feet six inches high, exclusive of the pedestal, and weighs thirty tons; it represents a soldier in the United States uniform, standing at rest, and is located in front of the north central entrance of the Main Building, and opposite Memorial Hall. American Soldiers' Monument.

BARTHOLDI ELECTRIC LIGHT (No. 51½).—This was situated immediately west of Cook, Son & Jenkins' Pavilion, on the border of the lake, and consisted of an arm of the statue to be erected in New York harbor. Bartholdi Electric Light.

BARTHOLDI'S FOUNTAIN (No. 12).—Architect, A. Bartholdi of Paris. Size, basin, 26 feet in diameter; height, 30 feet; statue, 11 feet. Situated in the Esplanade, in front of the main entrance to the grounds; constructed of iron bronzed, and cast in Paris by A. Durenne. In the centre of the basin is erected a triangular pedestal, on the faces of which are aquatic monsters, and fishes spouting water. Upon the pedestal are three female Caryatides, supporting a basin 13 feet in diameter, which receives the water from an upper basin upheld by three infant Tritons; Bartholdi Fountain.

the whole surmounted by a Mural Crown, through which the water flows. An illuminating apparatus is attached, in order to combine the effects of light and water. This fountain is intended to embody an allegorical representation of the elements Water and Light. It was purchased by the United States Government for the Capital Grounds at Washington.

Bishop Allen's Monument.

Bishop Richard Allen's Monument (No. 91).—Size, base, 6 feet by 6 feet; height, 16 feet. Erected in memory of the Rev. Richard Allen, founder and first Bishop of the African Methodist Episcopal Church; situated between Fountain and State Avenues, west of the United States Government Buildings.

B'nai B'rith Monument.

B'nai B'rith Monument (No. 103).—Erected by the Israelites to Religious Liberty, and situated between the Art Gallery and its Annex.

Catholic Fountain.

Catholic Total Abstinence Fountain (No. 13).—Architect, Herman Kirn, Philadelphia. Situated at the junction of Fountain Avenue and the Avenue of the Republic, at the north-western corner of Machinery Hall. In design it is a circular platform, with four arms projecting at right angles, terminating in four smaller circular platforms. From the centre of the large circle rises a marble rockwork 16 feet high, with a diameter of 18 feet at base, on which stands a statue of Moses smiting the rock. The water descends from numerous fissures into a basin 40 feet in diameter. On each of the circular platforms is a drinking fountain, 12 feet in height and 8 feet 8 inches in diameter, surrounded with statues 9 feet high, representing Father Mathew, Charles Carroll, Archbishop John Carroll, and Commodore John Barry. It was erected by contributions made by the numerous societies forming the Catholic Total Abstinence Union of America.

Columbus Monument.

Christopher Columbus Monument (No. 80).—Located at the corner of Belmont and Fountain Avenues. It was erected by the Columbus Monument Association. It is of colossal size, and represents the Genoese navigator in a standing posture, with the right hand resting on a globe, and the left holding a chart; an anchor and rope indicating his occupation.

Drinking Fountains.

Drinking Fountains.—See "Places of Refreshment."

Dying Lioness

Dying Lioness (No. 146).—This bronze work of art was in the plaza due east of the Art Gallery. It was modeled by Professor Wolf, Berlin, and cast by F. v. Müller, Munich. It is owned by the Park Commission.

Mott Fountain.

Fountain of the Jordan L. Mott Iron Works of New York (No 180).—Located east of Horticultural Hall. An iron fountain 45 feet in diameter and 26 feet high. There are four figures at the base, and the top is surmounted by the design of "Venus Rising from the Sea." In the interior of the different buildings were located several fountains of varied designs.

Howe Monument.

Howe Monument (No. 52½).—This monument was erected by the Howe Machine Co., to the memory of Elias Howe, Jr., the first inventor of sewing machines in this country. It was designed by Mr Ellis, and cast by Wood Bros., of Philadelphia, and was situated at the western end of the lake, opposite northern central entrance to Machinery Hall.

Naval Group.

NAVAL GROUP (No. 145).—Exhibitors, Ames Manufacturing Company, Chicopee, Mass. Larkin G. Meade, Sculptor. A bronze group, for the Lincoln Monument, Springfield, Illinois; located in front of Memorial Hall.

New England Granite Monuments, etc.

NEW ENGLAND GRANITE COMPANY'S EXHIBIT (No. 29).—Situated in front of Board of Finance office, and consists of a Corinthian monument, 46 feet high, crowned with the statue of Hope. A canopy, 40 feet high, surmounted by spire and cross, under canopy a figure indicative of Memory. A Gothic monument with four polished columns at corners of die; a model of statue representing soldier of 1776 (life size); an individual memorial crowned with cross; a Gothic column, surmounted by spire and turrets; a Scotch granite polished monument, 16 feet high, with circular dome terminating in a finial; an individual memorial; a small monument, terminating in an urn; and a rustic monument, with ivy-circled column surmounted with cross.

Stone Ornaments.

ORNAMENTAL STONE WORK (No. 49).—An exhibit of brown stone. representing a double entrance to dwelling. elaborately carved, with rough dressed trimmings. It was located south of St. Cecilian Organ and Main Building Annex No. 1.

Terra-Cotta Pipes.

TERRA-COTTA PIPES (No. 45).—Exhibited by E. W. Rittenhouse & Bro., Baltimore,Md., and comprising drain pipes of different sizes, elbows, angles, etc. South-west of Machinery Hall, and adjoining the Gas Machine.

Tombstones.

TOMBSTONES (No. 44).—This exhibit was situated south of the Main Building, near the central entrance, and consisted of tombstones, inclosed by an ornamental iron fence.

Statue of Washington.

WASHINGTON (No. 50).—Exhibitor, M. Dickerson Eyre, Florence, Italy. This statue is designed after Leutze's painting of "Washington Crossing the Delaware." It is of marble, heroic in size, being twelve feet high, and standing on a pedestal built of wood and Portland cement. It was situated south of, and directly in front of Judges' Hall.

Winged Horses.

WINGED HORSES.—Owned by the Fairmount Park Commission. In front of Memorial Hall are situated two bronze groups, each representing the mythological winged horse Pegasus; by the side of one stands a figure emblematic of Music, and by the other a figure representing History. They were cast in Vienna, and presented to the Park Commission.

MUSIC PAVILION AND CAMPING GROUNDS.

Camp of West Point Cadets.

CAMP OF WEST POINT CADETS (No. 16).—Located on the eastern slope of George's Hill, at the western end of Fountain Avenue. The tents accommodated 300 cadets, with officers and band.

Hunters' Camp.

HUNTERS' CAMP (No. 128).—"Forest and Stream" Publishing Co., N. Y., Wm. C. Harris, Manager. This camp illustrated sportsmen's life in the backwoods, and contained what is known as a permanent camp, built of logs and bark, with all the appurtenances of hunting and fishing, including portable boats, sporting firearms, rods and fishing tackle ready for use, portable cooking apparatus, specimens of game birds, a kennel of sporting dogs, etc., etc. An additional feature was a lake or pond stocked with game fish, and a running stream containing brook trout. It was located in the ravine south of Horticultural Hall.

Music Pavilion.

MUSIC PAVILION (No. 140).—Pavilion with ornamented dome, situated in Lansdowne ravine, near the bridge. It was used by the various bands during the Exhibition.

THE SYSTEM OF CLASSIFICATION.

Special Committee.

A Special Committee to prepare and report a mode of classification, which should be both geographical and systematic, under which objects for exhibition might be classified and arranged, was appointed by the Commission at its first session, in March, 1872. The subject was one of great importance, and, in its development, the methods which had been employed at previous International Exhibitions were carefully considered. In due time a system was prepared, adopted, and published. But this system was adapted to a single Exhibition building, in which objects should be grouped in the order of raw materials, and then, in succession, the results of their use by man. The substitution of five principal buildings for one rendered this mode of grouping impracticable, since raw materials had to be referred to the several structures appropriated to agricultural, horticultural, and mining products, and so with the other departments of the Exhibition.

System reported and adopted.

Revision of the System.

A revision and re-arrangement of the system became, therefore, a necessity, but the changes were made with as little departure from the original form as possible. The full text of the System of Classification, as adopted and used at the Centennia Exposition, is given in Vol. II, pp. 1–21. A Synopsis of the Classification will be found in the Introduction to the same volume. p. xiv.

Text and Synopsis of the System.

ADMISSIONS.

The Department of Admissions was under the superintendence of Mr. DAVID G. YATES, as General Manager, and a corps of assistants. There were thirteen entrance-gates, located at convenient points in the line of the enclosing fence, several of which were designated as "Complimentary"; the others were labelled "Exhibitors," "Money," etc., in accordance with the several classes of persons entering thereat. The gates were provided with self-registering turnstiles which communicated directly by telegraph with the Department of Admissions in the Board of Finance Building, so that, at any hour during the day, the total number of admissions was readily ascertainable at headquarters. There were

Entrance gates.

Self-registering turnstiles.

Number of admissions ascertainable at any hour.

employed 120 gate and turnstile keepers, who were responsible to the Chief of the Department, and at all times liable to the scrutiny of his force of Inspectors.

Gate-keepers.

A sufficient number of exit-gates were also provided. These were furnished with turnstiles which readily allowed visitors to pass out of the enclosure, but effectually excluded their return except through the entrance-gates.

Exit gates.

Complimentary tickets were issued to the Executives, Heads of Departments, and Legislatures of the National and State Governments; to the officers and members of the various State Boards and Foreign Commissions; to the Board in charge of United States Exhibits; to the Women's Executive Committee; and to such other officials and persons as the Centennial authorities deemed worthy of such distinction. These tickets were good during the entire Exhibition, the holder simply being required, on entering, to deposit his or her personal card as a basis of statistics.

Complimentary tickets.

The members of the Press were provided with admission tickets, issued under special regulations prescribed by a Committee appointed by the Board of Finance for that purpose. Some of these were permanent, and were distributed among the leading members of the fraternity; others were temporary, being issued on the application of parties who desired to remain but a day or two at the Exhibition. On the expiration of the time named therein, the tickets of the latter class were taken up at the gates, but, if desired, renewals were readily obtained on application to the Committee.

Complimentary tickets for members of the Press.

The passes issued to Exhibitors and their attendants; to employés connected with the State Boards, Foreign Commissions, etc., and to workmen engaged within the enclosure contained in most, if not all, cases, the photographs of the respective holders, with the dates of the 180 days of the Exhibition printed consecutively in the margin. At the first entrance of the holder on any one day, the corresponding date was punched out by the turnstile-keeper. If the holder desired to go outside and return during the same day, a check was furnished him for that purpose.

Passes for exhibitors, employes, workmen, etc.

The passes to Exhibitors, or their Agents and attendants (with the required photographs), were issued upon the requisition of the Bureau of Installation, and numbered in the aggregate 4,821. The number of workmen's passes issued through the same Bureau may be estimated at 5,500.

Number of passes issued.

The hours for admission were originally fixed from 9 A. M. to 6 P. M., Exhibitors, Agents, and attendants being allowed to enter in the morning an hour earlier than the general public. In July, however, it was deemed advisable to change the opening hour to 8 A. M., in order to accommodate the many thousands who arrived by the early trains, and who desired to enter the grounds without delay.

Hours of admission.

Change made in July.

The price of each admission was originally fixed at fifty cents, payable in one note at the entrance gate. As change for larger notes was not furnished at the gates and each entrance-fee had to be paid for sepa-

Price of Admission to Main Exhibition.

Difficulty in obtaining change.

Change furnished, *free*, by the Centennial Bank.

And for a *consideration*, by outside operators.

rately, parties were frequently put to serious inconvenience. Change was indeed furnished at the Centennial National Bank, but paying visitors were often appalled by the long lines of applicants, and rather than take their chances in the rear, and thus occasion delay to themselves and to friends who were perhaps with them, they would submit to petty extortions from outside operators, a number of whom were always on hand, prepared to furnish the desired change, either for a direct pecuniary consideration, or by effecting sales of wares or devices which the visitors in most cases really did not care to buy.

Half-rates for admission of children.

A special arrangement was made whereby the pupils and children of schools and institutions were, on reasonable notice from their teachers or protectors, admitted at half-rates. This system went into practical operation on Monday, July 24th, and was continued throughout the Exhibition.

Half-rates for the public on Saturdays.

It was afterwards decided to admit, at half-rates, all paying visitors on Saturdays. This plan was inaugurated on Saturday August 19th, and remained in force until Saturday, September 30th, when, the result not proving as remunerative to the Exhibition as had been anticipated, it was abandoned.

The system of payment at the gates changed.

Good results.

In the latter part of September, it was ordered, *first*, that one dollar, in coin or paper, should be received for two fifty-cent fares; *secondly*, that a fifty-cent piece of coin or paper should be received for two twenty-five cent fares; and, *thirdly*, that two pieces of coin or paper, of the value of twenty-five cents each, should be received for one fifty-cent fare. This change proved highly acceptable to the public, and it effectually destroyed the petty and annoying system of exchange brokerage which had too long been permitted to prevail outside the main gates of the enclosure.

Admission fee to live-stock show.

The charge for admission to the Live-Stock Exhibition, near the Centennial Grounds, was twenty-five cents.

Tables and summary of admissions.

The daily cash and free admissions for each month, the total of admissions during the Exhibition, and the aggregate of receipts derived therefrom, are shown by the following tables and summary:

MAY.

MAIN EXHIBITION.

Admissions in May.

Date.		Attendance.					Receipts.
		Paid.		Passes.		Total.	
		25 Cents.	50 Cents.	Exhibitors.	Complimentary.		Amount.
10	Wednesday..	....	76,172	10,500	100,000*	186,672	$38,086.00
11	Thursday....	....	14,722	2,274	2,001	18,997	7,361.00
12	Friday........	....	10,252	2,306	162	12,720	5,126.00
13	Saturday.....	....	11,659	4,847	357	16,863	5,829.50
Carried forward..		....	112,805	19,927	102,520	235,252	$56,402.50

* Estimated.

MAY—CONTINUED.
MAIN EXHIBITION.

Admissions in May.

Date.		Attendance.					Receipts.
		Paid.		Passes.		Total.	
		25 Cents.	50 Cents.	Exhibitors.	Complimentary.		Amount.
Brought forward..		....	112,805	19,927	102,520	235,252	$56,402.50
15	Monday... ...	....	10,896	4,585	367	15,848	5,448.00
16	Tuesday......	....	7,056	5,702	355	13,113	3,528.00
17	Wednesday..	....	12,117	6,208	387	18,712	6,058.50
18	Thursday....	....	11,054	6,325	440	17,819	5,527 00
19	Friday........	....	16,100	7,047	480	23,627	8,050.00
20	Saturday.. ...	....	18,191	7,379	546	26,116	9,095.50
22	Monday... ...	... .	12,403	7,928	540	20,871	6,201.50
23	Tuesday... ...	....	17,552	7,548	577	25,677	8,776.00
24	Wednesday..	....	20,539	8,997	655	30,191	10,269.50
25	Thursday. ...	....	19,821	6,749	586	27,156	9,910.50
26	Friday.........	....	16,792	6,740	587	24,119	8 396.00
27	Saturday.. ...	....	20,092	7,079	540	27,711	10,046.00
29	Monday... ...	....	16,202	6,772	493	23,467	8,101 00
30	Tuesday... ...	....	41,111	6,905	637	48,653	20,555.50
31	Wednesday..	....	26,249	8,280	634	35,163	13,124.50
Totals for May.		....	378,980	124,171	110,344	613,495	$189,490.00

JUNE.
MAIN EXHIBITION.

Admissions in June.

Date.		Attendance.					Receipts.
		Paid.		Passes.		Total.	
		25 Cents.	50 Cents.	Exhibitors.	Complimentary.		Amount.
1	Thursday....	....	23,200	7,046	630	30,876	$11,600.00
2	Friday.........	....	26,637	8,513	654	35,804	13,318.50
3	Saturday.. ...	....	22,292	7,889	560	30,741	11,146.00
5	Monday... ...	....	27,555	9,769	775	38,099	13,777.50
6	Tuesday... ...	....	28,354	9,619	652	38,625	14,177.00
7	Wednesday..	....	31,673	10,203	672	42,548	15,836.50
8	Thursday. ...	....	31,634	8,799	647	41,080	15,817.00
9	Friday.........	....	24,693	8,926	683	34,302	12,346.50
10	Saturday.. ...	....	28,948	9,129	674	38,751	14,474.00
12	Monday... ...	....	21,379	8,835	715	30,929	10,689.50
13	Tuesday... ...	....	24,223	8,701	636	33,560	12,111.50
14	Wednesday..	....	29,812	9,229	672	39,713	14,906.00
15	Thursday....	....	31,937	8,887	755	41,579	15,968.50
16	Friday.........	....	25,903	8,804	663	35,370	12,951.50
17	Saturday.. ...	....	25,902	8,870	612	35,384	12,951.00
19	Monday... ...	....	23,372	8,647	734	32,753	11,686.00
20	Tuesday... ...	....	27,204	8,662	669	36,535	13,602.00
21	Wednesday..	....	32,134	9,075	690	41,899	16,067.00
22	Thursday....	....	39,386	9,229	676	49,291	19,693.00
23	Friday.........	....	27,693	8,922	690	37,305	13,846.50
24	Saturday.. ...	....	25,103	8,987	661	34,751	12,551.50
26	Monday... ...	....	21,120	10,856	813	32,789	10,560 00
27	Tuesday... ...	....	20,343	9,580	643	30,566	10,171.50
28	Wednesday..	....	23,590	10,356	722	34,668	11,795.00
29	Thursday....	....	27,038	10,319	738	38,095	13,519.00
30	Friday.........	....	24,541	11,037	586	36,164	12,270.50
Totals for June.		....	695,666	238,889	17,622	952,177	$347,833 00

JULY.

MAIN EXHIBITION.

Admissions in July.

Date.		Attendance.					Receipts.
		Paid.		Passes.		Total.	Amount.
		25 Cents.	50 Cents.	Exhibitors.	Complimentary.		
1	Saturday......	....	26,410	10,650	769	37,829	$13,205.00
3	Monday......	....	47,786	11,355	958	60,099	23,893.00
4	Tuesday......	....	46,290	9,639	565	56,494	23,145.00
5	Wednesday..	....	51,825	10,084	917	62,826	25,912.50
6	Thursday....	....	46,088	10,861	661	57,610	23,044.00
7	Friday........	....	33,746	10,415	638	44,799	16,873.00
8	Saturday.....	....	23,207	10,247	570	34,024	11,603.50
10	Monday......	....	19,133	10,066	460	29,659	9,566.50
11	Tuesday......	....	20,645	10,101	412	31,158	10,322.50
12	Wednesday..	....	20,575	9,891	420	30,886	10,287.50
13	Thursday....	....	18,352	9,676	390	28,418	9,176.00
14	Friday........	....	18,333	9,849	405	28,587	9,166.50
15	Saturday......	....	16,057	9,653	374	26,084	8,028.50
17	Monday......	....	18,270	9,847	520	28,637	9,135.00
18	Tuesday......	....	19,184	9,577	534	29,295	9,592.00
19	Wednesday..	....	18,729	9,503	516	28,748	9,364.50
20	Thursday....	....	16,681	8,826	429	25,936	8,340.50
21	Friday........	....	17,714	9,202	476	27,392	8,857.00
22	Saturday......	....	16,942	9,349	446	26,737	8,471.00
24	Monday......	48	20,730	10,005	557	31,340	10,377.00
25	Tuesday......	....	21,914	9,086	509	31,509	10,957.00
26	Wednesday..	59	22,870	9,493	493	32,915	11,449.75
27	Thursday....	130	24,717	9,468	511	34,826	12,391.00
28	Friday........	....	18,924	9,537	520	28,981	9,462.00
29	Saturday......	3	15,949	9,452	490	25,894	7,975.25
31	Monday......	....	15,207	10,142	415	25,764	7,603.50
Totals for July.		240	636,278	255,974	13,955	906,447	$318,199.00

AUGUST.

MAIN EXHIBITION.

Admissions in August.

Date.		Attendance.					Receipts.
		Paid.		Passes.		Total.	Amount.
		25 Cents.	50 Cents.	Exhibitors.	Complimentary.		
1	Tuesday......	54	22,141	9,200	444	31,839	$11,084.00
2	Wednesday..	....	24,246	9,176	428	33,850	12,123.00
3	Thursday....	273	27,667	9,339	454	37,733	13,901.75
4	Friday........	....	25,015	9,329	447	34,791	12,507.50
5	Saturday......	....	22,304	9,570	426	32,300	11,152.00
7	Monday......	25	23,376	10,113	398	33,912	11,694.25
8	Tuesday......	120	23,939	9,069	391	33,519	11,999.50
9	Wednesday..	120	29,818	9,262	376	39,576	14,939.00
10	Thursday....	82	26,072	8,897	346	35,397	13,056.50
11	Friday........	13	25,880	9,241	374	35,508	12,943.25
12	Saturday......	74	22,240	9,503	346	32,163	11,138.50
Carried forward..		761	272,698	102,699	4,430	380,588	$136,539.25

AUGUST—Continued.

MAIN EXHIBITION.

Admissions in August.

Date.		Attendance.					Receipts.
		Paid.		Passes.		Total	
		25 Cents.	50 Cents	Exhibitors.	Complimentary.		Amount.
Brought forward..		761	272,698	102,699	4,430	380,588	$136,539.25
14	Monday......	8	22,656	9,812	404	32,880	11,330.00
15	Tuesday......	63	25,283	9,059	412	34,817	12,657.25
16	Wednesday..	119	28,341	9,113	386	37,959	14,200.25
17	Thursday....	166	27,031	8,963	306	36,466	13,557.00
18	Friday........	125	25,664	9,150	368	35,307	12,863.25
19	Saturday.....	54,045	....	9,252	352	63,649	13,511.25
21	Monday......	....	28,981	9,981	437	39,399	14,490.50
22	Tuesday.....	202	31,825	9,319	353	41,699	15,963.00
23	Wednesday..	313	39,082	9,415	381	49,191	19,619.25
24	Thursday....	395	55,930	10,248	479	67,052	28,063.75
25	Friday........	....	32,298	9,426	387	42,111	16,149.00
26	Saturday.....	97,172	....	10,075	383	107,630	24,293.00
28	Monday......	146	34,653	10,057	369	45,225	17,363.00
29	Tuesday......	10	41,310	9,767	375	51,462	20,657.50
30	Wednesday..	183	43,424	9,778	352	53,737	21,757.75
31	Thursday....	1,023	44,777	9,982	360	56,142	22,644.25
Totals for Aug.		154,731	753,953	256,096	10,534	1,175,314	$415,659.25

SEPTEMBER.

MAIN EXHIBITION AND LIVE-STOCK.

Admissions in September.

Date.		Attendance.										Receipts
		Paid.		Passes.			Paid.	Passes.				
		Twenty-five Cents.	Fifty Cents.	Exhibitors.	Complimentary.	Total Main Exhibition.	Twenty-five Cents.	Exhibitors.	Complimentary.	Total Live Stock.	Grand Total.	Amount.
1	Friday.........	17	34,182	9,807	414	44,420	530	121	34	688	45 108	$17,227.75
2	Saturday.. ...	58,591	....	10,304	424	69,319	821	149	34	1,004	70,323	14,853.00
4	Monday.......	176	35,495	10,484	808	46,963	1,957	217	96	2,270	49,233	18,280.75
5	Tuesday.......	217	50,209	10,011	471	60.908	3,529	362	106	3,997	61,905	26 041.00
6	Wednesday.	164	53,395	9,805	459	63,823	5,881	434	127	6,442	70.265	28,208.75
7	Thursday.....	210	59,356	9,921	492	69,979	4,493	495	77	5,065	75,044	30.853.75
8	Friday.........	140	50,604	10,050	500	61 294	8,164	666	124	8,954	70.248	27,378.00
9	Saturday.. ...	99,984	....	11.064	552	111,600	4,330	357	50	5,737	116.337	26,078.50
11	Monday......	. ...	40,838	10.630	448	51,916	671	301	31	1,003	52.919	20,586.75
12	Tuesday	....	59,089	10 402	472	69,963	3,911	406	48	4,355	74,328	30,522.25
13	Wednesday	33	72,502	10.777	532	83,844	6,420	408	55	6.883	90.727	37,864 25
14	Thursday.....	....	78.977	11.075	554	90 606	6,818	393	51	7.262	97,868	41,193.00
15	Friday..... ...	23	63,813	10.846	511	75,193	505	198	11	714	75,997	32,038.50
16	Saturday.. ...	91,914	....	11 200	482	103,596	166	174	9	349	103,945	23,020.00
18	Monday.......	209	62,623	11,043	449	74,324	109	137	5	251	74,575	31,391.00
19	Tuesday	213	92,413	11,121	512	104 259	240	155	13	408	104,667	46,319.75
20	Wednesday.	247	100,502	11,186	516	112,451	749	140	19	908	113,359	50.500 00
21	Thursday.....	778	117,941	11 824	597	131,140	3,284	136	28	3.448	134,588	59.986 00
22	Friday.........	268	85,953	11.216	450	97,887	3,212	221	31	3,464	101,351	43.846.50
23	Saturday.. ...	83,901	....	10,585	380	94,866	726	225	15	966	95,832	21,156.75
25	Monday.......	36	66,281	11,445	511	78.273	2,395	265	32	2.692	80.965	33,748.25
26	Tuesday	330	78.216	10.986	444	89,976	2.398	339	43	2,780	92 756	39.790.00
27	Wednesday.	....	89,654	11,661	1,128	102,443	3,376	389	51	3,816	106,259	45,671 00
28	Thursday.....	33,806	217,526	16 007	1,314	268.653	5,837	387	42	6,266	274,919	118 673.75
29	Friday.........	41	71,664	10.933	473	83 111	3,268	360	55	3,683	86,794	36,659.25
30	Saturday.. ...	103,385	....	11,008	415	114,808	1 285	355	19	1,659	116,467	26,167.50
Totals for September.		474,683	1,581,233	285,391	14,708	2.355 615	75,075	7,793	1,206	84,074	2,439,689	$928,056.00

OCTOBER.

MAIN EXHIBITION AND LIVE STOCK.

Admissions in October.

Date.		Attendance.										Receipts.
		Paid.		Passes.			Paid.	Passes.				
		Twenty-five Cents.	Fifty Cents.	Exhibitors.	Complimentary.	Total Main Exhibition.	Twenty-five Cents.	Exhibitors.	Complimentary.	Total Live Stock.	Grand Total.	Amount.
2	Monday	....	65 865	11,759	480	78,104	2,309	363	19	2,691	80,795	$33,509.75
3	Tuesday.......	205	77,536	11,254	1,020	90,015	3,116	254	30	3,400	93,415	39,598.25
4	Wednesday.	63	87,577	11,269	474	99,383	3,246	432	28	3,706	103,089	44,615 75
5	Thursday.....	53	88,924	11,339	463	100,779	83	75	9	167	100,946	44,496.00
6	Friday........	102	76,046	11,531	513	88,192	19	55	3	77	88,269	38,053.25
7	Saturday	293	72,576	11 746	457	85,072	25	53	5	83	85,155	36,367.50
9	Monday	32	71,704	12,145	497	84,378	72	26	4	102	84,480	35,878 00
10	Tuesday.......	5	79,435	11,531	492	91,463	448	60	8	516	91,979	39,830.75
11	Wednesday.	173	93,449	12,049	499	106,170	709	99	17	825	106,995	46,945.00
12	Thursday...	30	100,603	12,162	1,583	114,378	908	111	25	1,044	115,422	50,536.00
13	Friday........	542	80,505	11,685	483	93,215	879	147	23	1,049	94 264	40,607.75
14	Saturday	68	77,321	11,902	512	89,803	889	149	30	1,068	90,871	38,899 75
16	Monday	120	73,871	12,136	560	86,687	666	159	16	841	87,528	37,132 00
17	Tuesday......	442	91,412	11,523	450	103,827	1,084	155	18	1,257	105,084	46,087.50
18	Wednesday	777	123,080	13,277	643	137,777	920	159	18	1,097	138,874	61,964 25
19	Thursday....	1,240	160,115	13,238	1,814	176,407	....	....	......	....	176,407	80,367.50
20	Friday..... ..	95	94,040	11,679	1,851	107,665	....	....	......	....	107,665	47,043.75
21	Saturday	821	72,108	11,655	458	85,042	....	....	......	....	85,042	36,259.25
23	Monday	150	73 774	11,858	480	86,262	....	....	......	....	86,262	36,924.50
24	Tuesday.....	193	88,327	11,744	493	100,757	....	....	......	....	100,757	44,211 75
25	Wednesday.	648	106,338	11,842	461	119,289	....	....	......	....	119,289	53,331.00
26	Thursday.....	482	121,818	12,583	778	135,661	....	....	......	....	135,661	61,029 50
27	Friday	1,186	94,377	11,952	565	108,080	....	....	......	....	108,080	47,485 00
28	Saturday	1,171	77,559	11,771	471	90,972	....	....	......	....	90,972	39,072 25
30	Monday	356	79,683	12,008	532	92,579	....	....	......	....	92,579	39,930.50
31	Tuesday	1,194	80,673	11,716	448	94,031	....	....	......	....	94,031	40,635.00
Totals for October.		10,441	2,308,716	309,354	17,477	2,645,988	15,373	2,297	253	17,923	2,663,911	$1,160,811.50

NOVEMBER.

MAIN EXHIBITION.

Admissions in November.

Date.		Attendance.					Receipts.
		Paid.		Passes.		Total.	
		25 Cents.	50 Cents.	Exhibitors.	Complimentary.		Amount.
1	Wednesday..	1,137	106,578	12,269	494	120,478	$53,573.25
2	Thursday....	1,102	114,196	12,224	500	128,022	57,373.50
3	Friday.......	2,210	81,684	11,771	526	96,191	41,394.50
4	Saturday	3,012	81,118	12,377	540	97,047	41,312 00
6	Monday......	1,304	76,632	11,877	504	90,317	38,642.00
7	Tuesday	1,696	74,357	11,320	486	87,859	37,602.50
8	Wednesday..	1,427	89,161	11,952	587	103,127	44,937.25
9	Thursday....	6,757	170,167	15,289	865	193,078	86,772 75
10	Friday.......	4,466	101,901	14,480	874	121,721	52,067.00
Totals for Nov.		23,111	895,794	113,559	5,376	1,037,840	$453,674.75

SUMMARY OF ADMISSIONS AND RECEIPTS.

	ATTENDANCE.										Receipts.
	Paid.		Passes.		Total Main Exhibition.	Paid.	Passes.		Total Live Stock.	Grand Total.	
	Twenty-five Cents.	Fifty Cents.	Exhibitors.	Complimentary		Twenty-five Cents	Exhibitors.	Complimentary.			Amount.
May		378,980	124,171	110,344	613,495					613,495	$189,490.00
June		695,666	238,889	17,622	952,177					952,177	347,833.00
July	240	636,278	255,974	13,955	906,447					906,447	318,199.00
August	154,731	753,953	256,096	10,534	1,175,314					1,175,314	415,659 25
September	474,683	1,581,233	285,391	14,308	2,355,615	75,075	7,793	1,206	84,074	2,439,689	928,056.00
October	10,441	2,308 716	309,354	17,477	2,645,988	15,373	2,297	253	17,923	2,663,911	1,160,811.50
November	23,111	895,794	113,559	5,376	1,037,840					1,037,840	453,674.75
Total	663,206	7,250,620	1,583,434	189,616	9,686,876	90,448	10,090	1,459	101,997	9,788,873	$3,813,723.50

Workmen before 7 A. M. during month of May	71,445
Workmen before 7 A. M. during month of June	50,648
Wagons, Military, etc	25,250
Total week-day attendance	9,936,216
Population of the grounds, Commissioners and others, having regular complimentary tickets, on Sundays	52,000
Visitors on Sundays	13,250
Grand total attendance, May 10 to November 10, inclusive	10,001,466

Total paid admissions	8,004.274
Total free admissions	1,997.192
Total	10,001,466

The Exhibition was open 159 week-days.

Average paid admissions per day	50,341
Average free admissions per day	12,151
Average total admissions per day	62,492

Average attendance per day for each month was as follows:

May	19 days	36,049
June	26 "	38,570
July	26 "	34,863
August	27 "	43,530
September	26 "	93,834
October	26 "	102,458
November	9 "	115,316
Total	159 days	

The largest attendance at any one time was 274,919, on "Pennsylvania Day," Thursday, September 28
The smallest attendance at any one time was 12,720, on Friday, May 12.

TRANSPORTATION.

Bureau of Transportation.

The Bureau of Transportation, organized April 1, 1875, was charged with the supervision of "Foreign transportation for goods and visitors in the United States, local transportation, and warehousing and customs regulations."

Foreign transportation.

Foreign goods arriving at Philadelphia, New York, Baltimore, and San Francisco, regulations relative to

Canadian goods.

As the transportation of goods and visitors from foreign countries necessarily required the service of the principal Railroad and Ocean lines, the securing of favorable rates and privileges from the various companies rested mainly with the Commissioners of the participating countries. Foreign goods arriving at Philadelphia by vessels were held at the wharves until a warehouse entry had been made and a permit granted, after which they were transported to the Exhibition by railroad; those arriving at New York and Baltimore were brought to the grounds in sealed cars, those arriving at San Francisco, were subject to customs regulations similar to those adopted at Philadelphia; and Canadian goods were shipped in cars sealed by the United States Consul at the place of shipment. All articles were required to be unloaded under the supervision of a customs officer, who alone had authority to break the seals.

Special rates for American exhibits.

Free transportation in certain cases.

Special concessions in rates for the transportation of American Exhibits were secured from nearly every Railroad and other transportation company in the country. The officers of these corporations not only seconded in this way the efforts of the Bureau for favorable rates and arrangements in the shipment of goods, generally, but many of the Companies gave, within the States where located, free transportation for articles intended for the collective exhibitions of their respective States, thereby contributing materially to the success of such displays.

Reception and disposal of exhibits.

Railroad tracks and sidings.

Vehicles and appliances used in handling goods.

The regulations and appliances for the reception and disposal of goods cannot be mentioned here in detail. Numerous Railroad sidings were provided in the grounds, and connections were made with tracks running directly into the principal buildings. Thus, when the cars were assorted, an engine would draw the Exhibits to a point as near their intended location in the Exhibition as possible. In handling and moving the goods, a great variety of vehicles and apparatus adapted to such purposes was employed as circumstances required. These consisted of wagon trucks, warehouse trucks, express trucks, portable platforms, trestles, locomotive steam cranes, portable hoists, racks for moving plate glass, and various other useful and powerful implements and machines.

Terminal force.

Centennial Terminal Agency (Limited).

In this connection it was deemed best to entrust to an organized body of men, known as the terminal force, the exclusive privilege of unloading cars, placing goods in their proper spaces, and of rendering all requisite service relating thereto. The Exhibition authorities accordingly made a contract with the Centennial Terminal Agency (Limited) to perform the work. In payment of such service, certain specified terminal charges were collected from the Exhibitors. Trouble, expense, and confusion were avoided by this system, and it seems in all respects to have been superior to any adopted at former Expositions; but the collection of terminal charges, though certainly reasonable enough, was misunderstood and became the subject of such frequent complaints and misrepresentations, that the Centennial authorities finally determined to assume the charges as a general expense of the Exhibition, and to refund those which had already been collected.

Terminal charges.

Their collection a source of complaint.

Canceled and refunded.

Of the several companies conducting express business, only the Adams Express Company opened an office at the Exhibition. It proved a great convenience to Exhibitors in the delivery of small packages. In case goods were brought to the grounds by cartage or by hand, the person in charge, on reporting at the office, received a permit to enter, and was directed where to deliver his load.

Adams Express Company.

Permits for cartage goods.

The labels or tags used, with the careful and exact manner in which they were filled, greatly facilitated the prompt and certain delivery of Exhibits. The flag and name of each country was printed on its labels, as shown in the following copy:

Labels.

TO THE

DIRECTOR-GENERAL

OF THE

UNITED STATES CENTENNIAL COMMISSION,

INTERNATIONAL EXHIBITION OF 1876,

AT PHILADELPHIA.

MAIN BUILDING.

Siding **No. 3.**	Exhibitor, *J. L. Mott Iron Works.*
Location, *N. 65.*	Address, *New York.*
No. of Application, *2471.*	No. Packages } Serial, *8*
Weight, *486* Pounds.	Total, *64*

The terminal force had the handling and storage of empty packing cases, the total number of which was about thirty thousand, not including the great number of smaller cases placed within the larger ones. On the morning of August 26th, a fire destroyed four of the sheds, with their contents of empty cases. The losses were: Austria, 136 cases; France, 1,351; Great Britain, 1,240; Germany, 162; Mexico, 29; Norway, 51; Spain, 112; United States, 1,447; amounting in all to 4,528. Under the warehousing regulations these losses fell upon the owners, but the contractors recovered, upon policies of insurance held by them, damages for the destruction of their vested interests. At the close of the Exhibition, nineteen thousand empty cases were reclaimed, the balance being abandoned.

Storage of empty packing cases.

Number.

Fire.

Loss.

The arrangements for removing the Exhibits were as perfect as those

Removal of exhibits.

The work of dismantling
The transformation.

for their reception and installation. On the 13th November, the work of dismantling was begun in earnest in all the buildings, and in a very short time the glory of the Exhibition seemed to have departed. It was sad to witness the transformation—especially sad to those who had watched the growth of the wondrous display as though it had been some rare bud, which, expanding day by day, had in the by-gone spring unfolded itself in unexampled splendor.

Railroad service.
Promptness.
Freedom from accident.
The two principal lines.
Philadelphia & Reading R. R. Co.
Pennsylvania R. R. Co.
Generous co-operation.

The various Railroad lines in the vicinity of Philadelphia are entitled to great praise for their promptness in transporting material and Exhibits, for the precision with which their passenger trains were run, and for the remarkable freedom from accident which marked their several roads. The lines of the Philadelphia and Reading Railroad and Pennsylvania Railroad Companies, however, brought them into closer relations with the Exhibition than the others, and they spared neither pains nor expense in providing facilities for transportation. The former Company organized and operated a valuable train service between the Centennial grounds and the different sections of the City traversed by its tracks. The Pennsylvania Railroad Company made extensive purchases of ground, built many miles of track, and made other liberal arrangements for the public accommodation. The generous spirit shown by this company towards the Exposition has been the subject of the highest praise.

Centennial passengers, where delivered.

Excepting the Philadelphia and Reading Company, which had its depot in close proximity to the grounds, all the Railroads running to Philadelphia doing other than local business, delivered their Centennial passengers at the depot of the Pennsylvania Company, in front of the main entrance to the Exhibition.

Extent of Railroad service.

The extent of the Railroad service in relation to the Exhibition is shown by the following statement:

Number of loaded freight cars delivered in 1874, July to December, inclusive,	3,341
Number of loaded freight cars delivered in 1875, January to December, inclusive	10,479
Number of loaded freight cars delivered in 1876, January to November 10th,	6,340
Total	20,160

Heaviest day's passenger service.

The greatest passenger service within one day at the Centennial depots was as follows:

	Trains.	Cars.	Passengers.
At Pennsylvania Railroad depot	250	2,004	85,347
At Philadelphia and Reading Railroad depot	370	2,867	158,800
Total	620	4,871	244,147

Total number of R. R. passengers.

The number of passengers handled at the Centennial depots during the Exhibition was:

	Arriving.	Departing.	Total.
At Pennsylvania Railroad depot	1,392,697	1,219,516	2,612,213
At Philadelphia and Reading Railroad depot	1,726,010	1,569,110	3,295,120
Total	3,118,707	2,788,626	5,907,333

Difference in number of arriving and departing passengers.

The difference between the numbers of arriving and departing passengers results from the continuous movement of visitors going to the Exhibition during about eight hours, while the return movement was limited mainly to about four, many of the visitors in the former case either walking or employing other modes of conveyance.

Favorable rates of passage.

Result.

Through the vigilant efforts of the Bureau, which pressed the importance of the subject both early and late, very favorable rates were secured from the principal lines for transporting visitors, singly or in large bodies, to and from the Exhibition. This greatly increased the attendance, and is believed to have proved advantageous to all concerned.

Summary of facilities for local transportation.

The magnitude of the local facilities for transporting visitors is shown by the following statement:

1.—STEAM RAILROADS.

Railroads.

Number of routes to the Exhibition	10
Mileage of routes to the Exhibition	$63\frac{57}{100}$ miles.
Actual mileage of tracks therein	41 miles.
Number of stations for receiving passengers	67
Number of trains daily to the Exhibition	154
Number of street car connections	67
Mileage of connecting street car routes	238* miles.
Actual mileage of street railways connecting	96* miles.

2.—TRAMWAYS.

Tramways.

Number of lines running to the Exhibition	6
Mileage of the same	33* miles.
Actual mileage of streets traversed	30* miles.
Number of cars run on above, in one hour, one direction	193
Number of connecting lines selling exchange tickets over the above	103
Mileage of routes in these lines	294* miles.
Actual mileage of streets traversed by same	70* miles.

3.—STEAMBOATS ON THE SCHUYLKILL RIVER.

Steamboats.

Length of route	4½ miles.
Number of landings from which passengers were taken to the Exhibition	8
Number of trips hourly	12
Number of street car connections	6
Mileage of the routes of the same	17½* miles.

4.—CARRIAGES, ETC.

Carriages, etc.

Number of public carriages, etc., licensed to November 1st, 1876	533
Number of livery carriages	500
Total	1,033

* This does not include the mileage of that part of lines on which cars run *from* the connecting point.

Cost of round trip.

The cost of riding the round trip to and from the Exhibition, was from locations on different lines within the City, as follows:

On 22½ miles of railroad it was	16⅔ cents.
On 6½ miles it was	25 cents.
On 8 miles it was	32⅔ cents.
On 4 miles it was	45 cents.
On 33 miles of tramway lines it was	12½ cents.
On 71 miles it was	18 cents.
On 87 miles it was	25 cents.
On 4½ miles of river route it was	20 cents.

Omnibus rates, etc.

Rates for one seat in a public wagonette, omnibus, etc., to points in the direction towards the centre of the City, within about three miles distance from the Exhibition, were 25 or 50 cents, according to the vehicle.

Estimated capacity of transportation facilities.

The estimated capacity to transport visitors to the Exhibition by the different methods, from all sections of the City, was as follows:

By railroad, hourly	6,250	Up to 3 P. M.	50,000 visitors.
By tramways, hourly	12,180	Up to 3 P. M.	107,440 visitors.
By steamboat, hourly	2,500	Up to 3 P. M.	20,000 visitors.
By carriages, etc.	1,000	Up to 3 P. M.	8,000 visitors.
Total, hourly	21,930	Up to 3 P. M	185,440 visitors

Transportation on Pennsylvania Day.

Number of visitors.

Number of passenger trains.

But the actual experiences of Pennsylvania Day demonstrated what could be done in an emergency, and will better show the resources of the local transportation companies than any estimate that could be made. On that occasion the number of visitors exceeded that of any day at any Exhibition, the total number of admissions being 274,919. Over 200,000 people were at the Exhibition, within or without, at one o'clock P. M., and over 300,000 had been there by six o'clock P. M. Cars of every description were pressed into service and improvised for the occasion. On that day there were run to and from Philadelphia on these roads 638 passenger trains, in which were 2,993 cars, with 130,245 passengers; in addition to which, on the Pennsylvania and Philadelphia and Reading roads, over 200,000 local passengers were transported to and from the Exhibition. The movement of the vast throng is estimated to have been as follows:

Estimated number of persons transported

Attending the Exhibition	275,000
In the vicinity and not included in the above	50,000
Total	325,000
This number doubled to represent the coming and going	650,000
By railroad from without the city at Centennial stations	50,000
Local passengers by railroad	200,000
Local passengers by street cars	250,000
Walking, and from the immediate vicinity of the Exhibition	115,000
Carriages, etc.	20,000
Steamboats on the Schuylkill river	15,000

Total attendance at the Exhibition.

The total attendance of visitors, paying and free, at the Exhibition was 9,910,966,* which number doubled gives 19,821,932 as the number of persons transported to and from the Exhibition.

Total passenger movement to and from the Exhibition.

The movement of this vast number by the different methods of transportation was approximately as follows:

Railroad (city trains)	3,574,528
" from without the city	2,334,804
Tramway	10,557,100
Steamboat	556,500
Carriage	803,000
On foot	1,996,000
Total	19,821,932

Transportation within the enclosure. Narrow-gauge railroad. Trains. Character of the cars. Platforms. Fare. Safety and convenience.

To provide facilities for the transportation of visitors from one section of the Centennial enclosure to another, a narrow-gauge double-track Railroad, which made a circuit of the grounds, was built and equipped with locomotives and cars, under a concession granted to the West-End Passenger Railway Company. The trains ran from 8 o'clock, A. M., until 7 o'clock P. M, and made the circuit in 35 minutes. The cars were open at the sides, giving in all directions a view of the grounds, except when the storm-curtains were unrolled from the roof. The seats extended the full width of the cars. Passengers entered and left at the sides, platforms of the proper height being erected at the various stations for that purpose. The uniform fare was five cents, payable in advance to the collector on the platform. Every proper provision was made to prevent accidents. The road was very successfully run, and proved a great convenience.

Total business done.

The total business from May 15th to November 11th, was as follows:

Paying passengers	3,744,978
Free passengers	67,816
Total passengers	3,812,794
Gross earnings	$187,295 28

Rolling-chairs. Number in use. Rates.

The Centennial Rolling Chair Company made ample provision in the line of rolling-chairs for persons desiring such accommodation. The concession for this purpose was exclusive and established the schedule of rates to be charged. The number of chairs operated was 328; the number of stations for hiring chairs, in the buildings and on the grounds, was 22. The rates charged for the use of a chair, with an attendant, were, per hour, 60 cents; per half-day, $2.25; per day, $4.50. The rates, without an attendant, were 40 cents for the first hour, and 30 cents an hour afterwards.

Total of goods received.

The following statement shows the quantity of goods received, by countries, at the Exhibition, with the date of first receipt of goods from each country:

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*This is exclusive of the following item which will be found in the Summary of Admissions, page 157, viz.: "Wagons, Military, etc., 25,250."

Total of goods received.

COUNTRY.	Date of First Receipt of Goods.		No. of Packages	Weight, Pounds.
Argentine Republic	May 19th, 1876.		212	63,295
Austria	April 4th,	“	1,453	790,602
Belgium	March 7th,	“	1,275	893,263
Brazil	April 1st,	“	1,650	348,037
Canada	“ “	“	3,891	1,367,671
China	“ 10th,	“	477	115,917
Chili	May 2d.	“	157	51,026
Denmark	April 5th,	“	157	41,564
Egypt	January 18th,	“	274	68,640
France	March 3d,	“	5,152	2,279,135
Germany	February 29th,	“	3,330	1,822,304
Great Britain and Colonies	January 21st,	“	7,385	4,266,039
Hawaii	April 4th,	“	93	11,370
Italy	March 31st,	“	1,750	475,071
Japan	January 19th,	“	7,112	1,241,125
Liberia	April 28th,	“	11	1,731
Mexico	“ 8th,	“	250	104,659
Morocco	March 18th,	“	48	40,440
Netherlands	“ 20th,	“	571	151,703
Norway	February 16th,	“	679	463,003
Orange Free State	March 27th,	“	15	5,130
Peru	April 29th,	“	60	6,760
Portugal	“ “	“	738	164,203
Russia	March 29th,	“	1,361	1,132,095
Siam	October 7th,	“	229	15,545
Spain	March 22d,	“	2,581	502,111
Sweden	February 16th,	“	1,586	860,177
Switzerland	April 1st,	“	340	108,903
Tunis	May 4th,	“	58	14,140
Turkey	April 6th,	“	121	25,004
United States	October 12th, 1875		111,228	38,064,234
Venezuela	March 16th, 1876.		29	4,720
			154,273	57,116,658

The first arrival of foreign building material was—Great Britain, December 10th, 1875; Sweden, December 1st, 1875; and Japan, January 19th, 1876.

Distribution of goods.

The distribution of the goods, with the number of packages and their weight, was as follows:

LOCATION.	No of. Packages.	Weight, Pounds.
Art Department	4,267	2,100,900
Main Building	61,203	20,168,801
Machinery Hall	37,319	19,542,989
Agricultural Hall	22,643	6,534,766
Horticultural Department	1,000	418,031
Shoe and Leather Building	2,658	574,387
Carriage Annex	2,937	1,574,103
Women's Pavilion	1,037	98,698
United States Government Building	10,820	2,658,705
Foreign Building Materials	2,279	608,115
Miscellaneous	4,557	1,433,699
Live Stock and Equipment	3,553	1,403,464
Totals	154,273	57,116,658

Efficient management of the Bureau.

The Chief and his Assistants.

The system of transportation required at the Centennial Exhibition involved duties which few men would be properly capacitated to discharge. As *Chief of the Bureau*, Captain DOLPHUS TORREY anticipated emergencies and provided for them; he was prompt, efficient, obliging, and always in readiness; and as an official he made for himself a record which does him infinite credit. His assistants were: *Superintendent of Customs Department*, J. W. Hampton, Jr.; *Cashier*, Ethelbert Watts; *Accountants*, Robert W. Beatty, W. H. Woodward; *Chief Clerk*, Richard Graham; *Contractors*, Centennial Terminal Agency, Limited.

INSTALLATION.

DEPARTMENTS I, II, III, OF THE CLASSIFICATION.

Bureau of Installation.

Officers.

The Bureau of Installation was under the able supervision of Mr. Henry Pettit, *Consulting Engineer of the Centennial Commission*, with a corps of assistants as follows: Main Exhibition Building and Annexes—*General Superintendent of Installation*, Rufus M. Smith. Main Exhibition Building—*Superintendent of Foreign Division*, A. B. Nichols; *Superintendent of Division A*, W. W. Coe; *Superintendent of Division B*, J. A. Kaiser; *Superintendent of Division C*, D. W. Flickwir; *Superintendent of Division D*, George U. Engle; *Chief Clerk, Installation and Records*, George C. Lancaster; *Chief Clerk, Maintenance and Engineering Department*, John R. Bingaman; *Special Duty, Office of Chief of Bureau*, John R. Coxe; *Mechanical Draughtsman*, Hugo Bilgram; *Architectural Draughtsman*, Marvin A. Wint; *Assistant Engineers*, George H. Paddock, Walter L. Keen. Main Annex—*Superintendent*, S. F. Merrill; *Assistant Superintendent*, W. F. Howe; *Special Duty, Superintendent's Office*, F. A. Merrill. Mineral Annex—*Superintendent*, George U. Engle. Volunteer Aids —*Special Duty, Office of Chief of Bureau*, Robert R. Corson, George W. Bacon, Levi E. Waller, W. A. Cochran.

Special duties.

The special duties devolving upon the Bureau were: 1. The classification and distribution to the other Bureaus of all applications for space in the American departments of the Exhibition. 2. The general installation of foreign countries within the Main Building. 3. The installation in detail of the American department, Main Building, including allotment of space to American Exhibitors. 4. The superintendence of the Main Building during the period of the Exhibition. 5. The general supervision of special structures.

Allotment of space in Main Building and Annexes.

Allotment of space in other departments.

Number of American applications for space.

The Main Building and its Annexes embraced Departments I, II, and III, and were directly under the control of the Bureau of Installation. Applications for space classified under the other Departments, namely, IV, V, VI, and VII, after being registered, were referred to the respective Bureaus having special charge of those Departments; after which any further communication that was necessary in regard to the applications was held by the Exhibitors directly with the Chiefs of those Bureaus. The total number of registered applications for space in the American Departments of the Exhibition was 14,175. The total number of Amer-

Number of American Exhibitors.

Rate at which applications for space were received.

ican Exhibitors was 9,266, showing a loss of 4,909 applicants. This loss has been ascribed to the fact that certain parties either changed their intention and declined to exhibit, or that they were refused admittance by the several Bureaus. The rate at which the applications for space were received is shown by the following:

TABLE.

Applications received previous to January, 1875. 862

1875.		1876.	
January	170	January	913
February	214	February	771
March	267	March	1,269
April	220	April	1,160
May	238	May	1,019
June	316	June	616
July	315	July	210
August	573	August	540
September	543	September	320
October	1,995	October	398
November	775		
December	471		
Total	6,097	Total	7,216

SUMMARY.

Previous to 1875	862
During 1875	6,097
During 1876	7,216
	14,175

Preparations for the opening day.

Final clean sweep.

Distinguished visitors May 9th.

Expressions of admiration.

Value of exhibits in Main Building.

A very general impression prevailed on the first of May that the Main Building could not be brought into condition for a creditable opening at the appointed time. This, however, proved to be a mistake. The work was pushed forward with amazing energy; the final clean sweep was made by the Janitor and his force on the 9th May; and during the evening of that day, His Majesty the Emperior of Brazil and suite, with many foreign commissioners and officers of the Centennial Commission and Board of Finance honored the Building with their presence. Their expressions of admiration were unanimous as they gazed upon the magnificent display spread out before them. It would be impossible to compute the inherent value of the Exhibits then first presented in the Main Building for inspection, but their commercial value has been carefully estimated upon data obtained from the Exhibitors themselves, and found to approximate closely to sixty-five millions of dollars ($65,000,000).

Space allotted to foreign nations.

The location of the space allotted to each foreign country may readily be determined by reference to the Diagram of the Main Building.*

No. of Exhibitors and av'ge space to each.

The following tables, arranged by countries, show the number of Exhibitors, and the average space to each Exhibitor, in the Main Building and its Annexes:

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* See Vol. II, *post* INTRODUCTION.

MAIN BUILDING.

DEPARTMENTS I, II, III, OF THE CLASSIFICATION.

In Main Building.

COUNTRY.	Total Area Allotted, including Intermediate Passage-ways.	Number of Exhibitors.	Average Area per Exhibitor.
Italy	8,943	352	25
Norway	6,959	111	63
Sweden	17,799	304	58
British Empire:			
Great Britain and Ireland	54,155	539	100
Victoria	5,167	302	17
New South Wales	4,213	187	23
South Australia	1,536	103	15
Queensland	3,406	131	26
New Zealand	1,664	92	18
Jamaica	722	39	19
Bermudas	494	32	15
Tasmania	1,372	99	14
Bahamas	472	37	13
Trinidad	367	29	13
British Guiana	344	20	17
Gold Coast	279	27	10
Cape of Good Hope	645	104	6
Straits Settlement	22	6	4
Mauritius, etc	282	40	7
India	3,208	1	3,208*
Canada	24,118	552	44
	102,466	2,340	44
Argentine Republic	2,861	369	8
Chili	3,424	87	40
Peru	1,462	80	18
Orange Free State	1,058	1	1,058*
China	6,628	80	83
Japan	17,831	284	63
Denmark	2,562	70	37
Turkey	3,347	1,606	2
Portugal	5,988	560	11
Tunis	2,015	18	112
Hawaii	1,575	80	20
Egypt	5,026	46	109
Spain	11,253	1,007	11
Russia	11,141	401	28
Austria and Hungary	24,727	346	71
Germany	29,872	668	45
France	45,460	721	63
Switzerland	6,693	387	17
Belgium	15,598	283	55
Brazil	6,899	324	21
Netherlands	15,948	137	116
Mexico	6,567	287	23
United States	224,826	2,751	82
	588,928	13,700	43

MINERAL ANNEX.

STATE COLLECTIVE MINERAL EXHIBITS AND CHINESE COLLECTIVE EXHIBIT.

In Mineral Annex.

COUNTRY.	Total Area Allotted, including Intermediate Passage-ways.	Number of Exhibitors.	Average Area per Exhibitor.
China	1,594	1	1,594*
United States	16,501	273	60
	18,095	274	66

* Government.

MAIN ANNEX.

CARRIAGES, CARS, HEATING APPARATUS, ETC.

In Main Annex.

COUNTRY.	Total Area Allotted, including Intermediate Passage-ways.	Number of Exhibitors.	Average Area per Exhibitor.
Great Britain and Ireland	4,130	10	413
New South Wales	63	1	63
Canada	1,015	8	127
	5,208	19	274
Italy	140	1	140
Russia	672	9	75
Austria and Hungary	154	1	154
Germany	237	1	237
United States	68,646	415	165
	75,057	446	168

RECAPITULATION.

Recapitulation.

BUILDINGS.	Total Area Allotted, including Intermediate Passage-ways.	Number of Exhibitors.	Average Area per Exhibitor.
Main Building	588,928	13,700	43
Main Annex	75,057	446	168
Mineral Annex	18,095	274	66
	682,080	14,420	47

American Exhibits in Main Building and Annexes, arranged by States.

The following tables, arranged by States, will show the Exhibits in the American section of the Main Building and its Annexes and adjacent grounds:

MAIN BUILDING.

In Main Building.

STATE.	Number of Exhibitors.	Number of Articles Exhibited.	Square Feet of Space Occupied.	Value of Exhibit.	Cost of Exhibiting.
Alabama	4	862	114	$1,240.00	$2,160.00
California	7	10,327	449	48,003.00	11,999.50
Connecticut	135	163,725	9,337	195,506.00	111,366.50
Delaware	8	81	124	617.00	847.00
District of Columbia	12	86	200	7,770.00	2,023.00
Florida	2	1,006	48	1,100.00	2,058.00
Georgia	2	28	74	1,531.00	805.00
Illinois	36	3,705	3,267	34,574.00	17,301.00
Indiana	48	691	1,871	88 524.00	19,737.50
Iowa	32	383	247	1,520.00	2,370.00
Kansas	2	101	13	1,310.00	550.00
Kentucky	24	602	247	2,948.00	1,894.50
Louisiana	6	166	80	4,248.00	1,129.50
Maine	61	1,681	1,042	13,587.00	11,324.00
Maryland	31	688	1,320	24,829.00	24,606.00
Massachusetts	404	82,523	18,763	413,861.00	243,396.50
Michigan	24	6,504	1,280	21,981.00	9,382.50
Carried forward	838	273,159	38,476	$863,149.00	$462,950.50

MAIN BUILDING.

In Main Building.

State.	Number of Exhibitors.	Number of Articles Exhibited.	Square Feet of Space Occupied.	Value of Exhibit.	Cost of Exhibiting.
Brought forward	838	273,159	38,476	$863,149.00	$462,950.50
Minnesota	2	17	14	200.00	100.00
Mississippi	3	56	90	800.00	400 00
Missouri	26	2,994	1,069	20,295.00	9,523.50
New Jersey	133	26,376	5,330	65,856.00	47,072.50
Nebraska	1	2	2	100.00	150.00
New Hampshire	24	1,864	600	10,029.00	7,204.00
New York	628	136,648	34,187	1,484,155.00	498,296.50
North Carolina	2	1,910	178	2,540.00	1,100.00
Ohio	138	8,197	5,228	91,113.00	35,584.50
Oregon	1	203	30	710.00	320.00
Pennsylvania	829	150,100	47,185	1,271,238.00	406,150.00
Rhode Island	87	32,403	2,946	147,995.00	44,784.50
South Carolina	2	18	21	450.00	300.00
Tennessee	12	204	87	956.00	629.00
Texas	3	419	19	594,00	1,200.00
Vermont	11	193	465	15,399.00	4,874.00
Virginia	5	799	219	2,264.00	989.50
West Virginia	4	1,026	303	1,640.00	3,340.00
Wisconsin	2	605	235	4,010.00	1,010.00
Total	2,751	637,193	136,684	$3,983,493.00	$1,525,978.50

MINERAL ANNEX.

(INSIDE UNDER COVER.)

In Mineral Annex.

State.	Number of Exhibitors.	Number of Articles Exhibited.	Square Feet of Space Occupied.	Value of Exhibit.	Cost of Exhibiting.
Alabama	3	496	232	$4,100.00	$2,710.00
Connecticut	1	15	20	2.00	25.00
Delaware	5	517	223	397.00	217.00
Illinois	8	795	525	916.00	1,505.00
Indiana	3	510	516	1,030.00	1,535.00
Iowa	6	215	442	1,200.00	400.00
Kentucky	1	2,000	1,044	10,000.00	7,000.00
Maryland	3	1,051	92	80.00	415.00
Massachusetts	4	53	226	194.00	480.00
Michigan	6	1,531	980	15,032.00	3,025.00
Missouri	5	1,452	524	5,227.00	2,612.00
New Jersey	2	654	217	233.00	63.00
New York	9	517	637	453.00	1,342.00
Ohio	151	10,678	1,395	70,135.00	5,687.00
Pennsylvania	32	1,951	2,473	14,495.00	5,937.00
Tennessee	2	42	237	50.00	1,000.00
Vermont	1	96	43	430.00	150.00
Virginia	1	200	336	500.00	500.00
Wisconsin	3	4,069	628	15,190.00	2,590.00
Wyoming Territory	1	1	51	75.00	40.00
Total	247	26,843	10,835	$139,789.00	$37,233.00

MINERAL ANNEX.
(OUTSIDE PLATFORM.)

On outside platform of Mineral Annex.

STATE.	Number of Exhibitors.	Number of Articles Exhibited.	Square Feet of Space Occupied.	Value of Exhibit.	Cost of Exhibiting.
Kentucky	1	2	30	$20.00	$25.00
New Jersey	2	40	120	60.00	55.00
New York	2	8	418	620.00	205.00
Ohio	1	4	75	80.00	15.00
Pennsylvania	5	17	1,438	738.00	665.00
Tennessee	1	20	86	20.00	10.00
Wisconsin	1	1	47	25.00	10.00
Total	13	92	2,214	$1,563.00	$985.00

MINERAL ANNEX.
(GROUNDS ADJACENT.)

On grounds adjacent to Mineral Annex.

STATE.	Number of Exhibitors.	Number of Articles Exhibited.	Square Feet of Space Occupied.	Value of Exhibit.	Cost of Exhibiting.
Connecticut	1	2	319	$2,500.00	$500.00
Massachusetts	2	2	139	365.00	60.00
New York	5	11	764	770.00	381.00
Ohio	1	50	233	110.00	50.00
Pennsylvania	4	4	1,639	2,275.00	1,515.00
Total	13	69	3,094	$6,020.00	$2,506.00

MAIN ANNEX.
CARRIAGES, ETC.

In Main or Carriage Annex.

STATE.	Number of Exhibitors.	Number of Articles Exhibited.	Square Feet of Space Occupied.	Value of Exhibit.	Cost of Exhibiting.
California	4	55	404	$1,840.00	$1,205.00
Connecticut	20	1,729	1,915	23,378.00	11,771.00
Delaware	11	47	2,205	37,990.00	7,275.00
Illinois	9	32	1,188	76,225.00	4,725.00
Indiana	9	47	466	7,260.00	8,145.00
Iowa	2	3	12	300.00	600.00
Kentucky	2	3	68	800.00	400.00
Louisiana	1	2	5	2,500.00	1,000.00
Maryland	5	12	154	1,400.00	800.00
Maine	4	17	209	1,100.00	1,400.00
Massachusetts	32	313	2,073	22,342.00	11,477.00
Michigan	4	29	614	2,700.00	1,400.00
Missouri	2	31	181	900.00	1,700.00
New Hampshire	7	26	223	1,820.00	500.00
New Jersey	27	1,341	1,801	16,094.00	11,970.00
New York	108	2,099	7,923	94,922.84	40,926.00
Ohio	23	1,192	1,175	13,454.00	8,035.00
Pennsylvania	170	5,624	9,083	95,485.00	45,764.00
Rhode Island	2	50	234	1,800.00	3,600.00
Vermont	2	7	169	650.00	400.00
West Virginia	1	6	15	200.00	100.00
Wisconsin	3	22	57	600.00	950.00
Total	448	12,687	30,174	$403,760.84	$164,143.00

MAIN ANNEX.

(GROUNDS ADJACENT.)

On grounds adjacent to Main Annex.

STATE.	Number of Exhibitors.	Number of Articles Exhibited.	Square Feet of Space Occupied.	Value of Exhibit.	Cost of Exhibiting.
New York	2	2	293	$2,000.00	$1,100.00
Pennsylvania	1	1	150	400.00	100.00
Total	3	3	443	$2,400.00	$1,200.00

RECAPITULATION.

LOCATION.	Number of Exhibitors.	Number of Articles Exhibited.	Square Feet of Space Occupied.	Value o Exhibit.	Cost of Exhibiting.
Main Building	2,751	637,193	136,684	$3,983,493.00	$1,525,978.50
Mineral Annex (Inside)	247	26,843	10,835	139,789.00	37,233.00
Outside Platform	13	92	2,214	1,563.00	985.00
Grounds Adjacent to Mineral Annex	13	69		6,020.00	2,506.00
Main Annex	448	12,687	30,174	403,760.84	164,143.00
Grounds Adjacent to Main Annex	3	3	443	2,400.00	1,200.00
	3,475	676,887	183,444	$4,537,025.84	$1,732,045.50

POST 58, G. A. R.

ART.

DEPARTMENT IV OF THE CLASSIFICATION.

Bureau of Art.

Foreign works of Art.

Supervision of American Sectio

Advisory Committee.

The Bureau of Art was under the general management of Mr. JOHN SARTAIN, of Philadelphia, a gentleman whose skill as an engraver, and whose taste as a *connoisseur* in matters of art, are well and favorably known on both sides of the Atlantic. The contribution of each foreign nationality was under the control of its own commission, but the American section was under the supervision of three committees, each charged with special duties: 1. An Advisory Committee. 2. A Committee on Selection. 3. A Committee on Arrangement. The Advisory Committee consisted of six members, three being from Philadelphia and three from New York. Two of the members were professional artists. The committee as originally constituted was composed as follows: JAMES L. CLAGHORN, Philadelphia; JOHN TAYLOR JOHNSON, New York; HENRY C. GIBSON, Philadelphia; WILLIAM TILDEN BLODGETT, New York; PETER F. ROTHERMEL, Philadelphia; and W. WORTHINGTON WHITTRIDGE, New York. Upon the death of WILLIAM TILDEN BLODGETT, WILLIAM J HOPPIN, of New York, was appointed to fill the vacancy.

Committee on Selection.

The Committee on Selection was composed of ten members, all professional artists, chosen by the Advisory Committee and approved by the Director General. They inspected the works submitted for exhibition, Committees in Paris, Munich, Rome.

Free transportation.

accepting those only which were deemed meritorious. Meetings were held for this purpose in Boston, New York and Philadelphia. The following gentlemen constituted this committee: Daniel Huntington, New York, figure painter; Jervis McEntee, New York, landscape painter; Thomas Hicks, New York, portrait painter; Henry K. Brown, New York, sculptor; J. Q. A. Ward, New York, sculptor; Samuel B. Waugh, Philadelphia, figure and portrait painter; William H. Willcox, Philadelphia, landscape painter; Howard Roberts, Philadelphia, sculptor; Thomas Robinson, Boston, animal and landscape painter; Richard M. Staigg, Boston, portrait painter. Committees of three gentlemen were constituted in Paris, Munich, and Rome, empowered to inspect American productions there and to recommend meritorious works to be exhibited. Free transportation from Europe was supplied by the United States Government, the ship "Supply" having been sent to Europe in January, 1876, to take on board such American productions as had been recommended by the resident committees. The "Supply" touched at Civita Vecchia, Leghorn, and Gibralter. The United States steamship "Franklin" conveyed to the "Supply" at Gibralter, the American works collected at Southampton and Cherbourg.

Committee on Arrangement.

The Committee on Arrangement was composed of seven members, six of whom were professional artists. This committee consisted of representative men, all of whom had been chosen to fill the position of President in the several art associations to which they belonged. The names of the members were: Professor C. Schussele, historical painter, President of the Board of Pennsylvania Academicians, Philadelphia; Isaac L. Williams, landscape painter, President Artists' Fund Society, Philadelphia; Howard Roberts, sculptor, President of the Philadelphia Sketch Club, Philadelphia; Thomas W. Walter, architect, President of the American Institute of Architects, Philadelphia; W. Worthington Whittridge, landscape painter, President of the National Academy of Design, New York; James D. Smillie, water-color painter, President of the Society of Painters in Water-Colors, New York; Charles C. Perkins, President of the Boston Art Museum, Boston.

Display of works of Art in the U. S. section of Memorial Hall.

Arrangement in the Art Annex.

Arrangement of photographs.

The United States section of Memorial Hall was filled with pictures taken indiscriminately from the aggregate contributions, which were deemed a fair representation of Amcrican art. In arranging the Art Annex, the pictures were permitted to be hung in groups, according to the locality from which they were contributed, and therefore the President of the National Academy of Design in New York directed the hanging of the New York pictures in the Annex; the President of the New York Society of Painters in Water-Colors arranged the water-colors from New York; the member from Boston hung the Massachusetts works, and the President of the American Institute of Architects arranged the architectural exhibit. The arrangement of the photographs was under the sole direction of Mr. John Carbutt, to whom had been intrusted the superintendence of that division of the Department.

Space occupied by United States exhibitors.

The United States filled the whole of their allotted space in Memorial Hall, and more was obtained from Great Britain, Germany, France, and Austria, through the courtesy of their commissions.

Painting, sculpture, and engraving.
Art applied to Industry.
Architecture, Mosaic work, etc.

In addition to painting, sculpture, engraving in all its varieties, and photography, including prints produced by the colloid processes, the Bureau of Art embraced many classes of work which have been termed "Art applied to Industry." Of architecture the art galleries contained a large display; there was an abundance of Mosaic work; the glass stainers' art was well represented; but the great bulk of the "Art applied" found place in the Main Building, because Exhibitors preferred to keep their various objects together in one group rather than to separate and distribute them in different localities according to the strict order of classification.

Antique marbles, bronzes, engraved gems, etc.
Majolica ware.
Textile fabrics.

Sig. Alessandro Castellani, of Rome, exhibited in Memorial Hall an extensive collection of antique marbles, bronzes, terra-cottas, and engraved gems. A history of personal ornament from the earliest times was thus given. The history of majolica ware was similarly illustrated by the best products of the successive periods of its manufacture. It also included textile fabrics.

Portrait of Prince Gortschakoff.

In the Russian Department was exhibited a fine portrait of Prince Gortschakoff, which that distinguished diplomatist presented to ex-Governor Curtin as a token of the friendly official and personal relations established between them during the period the latter represented the United States as Minister at the Court of St. Petersburg.

Dimensions of wall space covered.
American.
Foreign.
Floor space, American and foreign.
Number of Exhibitors.

The total length of wall covered was nearly two and a half miles, of an average height of between nine and ten feet. The total square feet of wall covered was 123,619; of which 46,829 square feet were covered by Americans, and 76,790 by foreigners. The total square feet of floor space covered was 11,981; 2,360 by Americans, and 9,621 by foreigners. The total number of Exhibitors was 2,472; 724 Americans and 1,484 foreigners on the walls, and 63 Americans and 201 foreigners on the floor.

The following tables are of interest in this connection:

SPACE OCCUPIED BY CONTRIBUTING NATIONS.

Space occupied by contributing Nations.

Nations.	Memorial Hall.		Art Annex.		Photographic Hall		Total.	
	Wall. Sq. Ft.	Floor. Sq. Ft.	Wall. Sq. Ft.	Floor. Sq. Ft.	Wall. Sq Ft.	Counters. Floor, S. Ft.	Wall. Sq. Ft.	Floor. Sq. Ft.
United States	13,475	618	19,872	916	13,482	826	46,829	2,360
Great Britain	10,824	259	....	....	1,339	80	12,163	339
France	7,905	183	9,480	280	730	....	18,115	463
Germany	6,186	416	....	....	1,845	77	8,031	493
Austria	3,932	79	....	....	714	36	4,646	115
Spain	1,126	25	1,834	70	....	....	2,960	95
Italy	824	1,602	3,676	5,821	....	....	4,500	7,423
Pope Pius IX	80	....	....	....	....	....	80	....
Belgium	422	312	5,004	8	88	....	5,514	320
Netherlands	....	....	4,956	....	....	....	4,956	....
Denmark	....	....	468	17	70	....	538	17
Sweden	1,150	50	2,199	26	288	....	3,637	76
Norway	300	9	1,139	17	....	....	1,439	26
Russia	1,428	75	....	....	734	....	2,162	75
Canada	....	....	1,050	28	1,269	....	2,319	28
Carried forward.	47,652	3,628	49,678	7,183	20,559	1,019	117,889	11,830

Space occupied by contributing Nations.

SPACE OCCUPIED BY CONTRIBUTING NATIONS.

NATIONS.	Memorial Hall		Art Annex.		Photographic Hall.		Total.	
	Wall. Sq. Ft.	Floor. Sq Ft.	Wall. Sq. Ft.	Floor. Sq. Ft.	Wall. Sq. Ft.	Counters Floor, S. Ft.	Wall. Sq. Ft.	Floor. Sq. Ft.
Brought forward.	47,652	3,628	49,678	7,183	20,559	1,019	117,889	11,830
Mexico	464	....	2,760	77	72	....	3,296	77
Brazil	....	....	1,280	74	216	....	1,496	74
Argentine Republic	....	....	396	....	288	....	684	....
Australia	....	....	....	....	126	....	126	....
Japan	....	....	....	....	128	....	128	....
Total	48,116	3,628	54,114	7,334	21,389	1,019	123,619	11,981

Number of Exhibits.

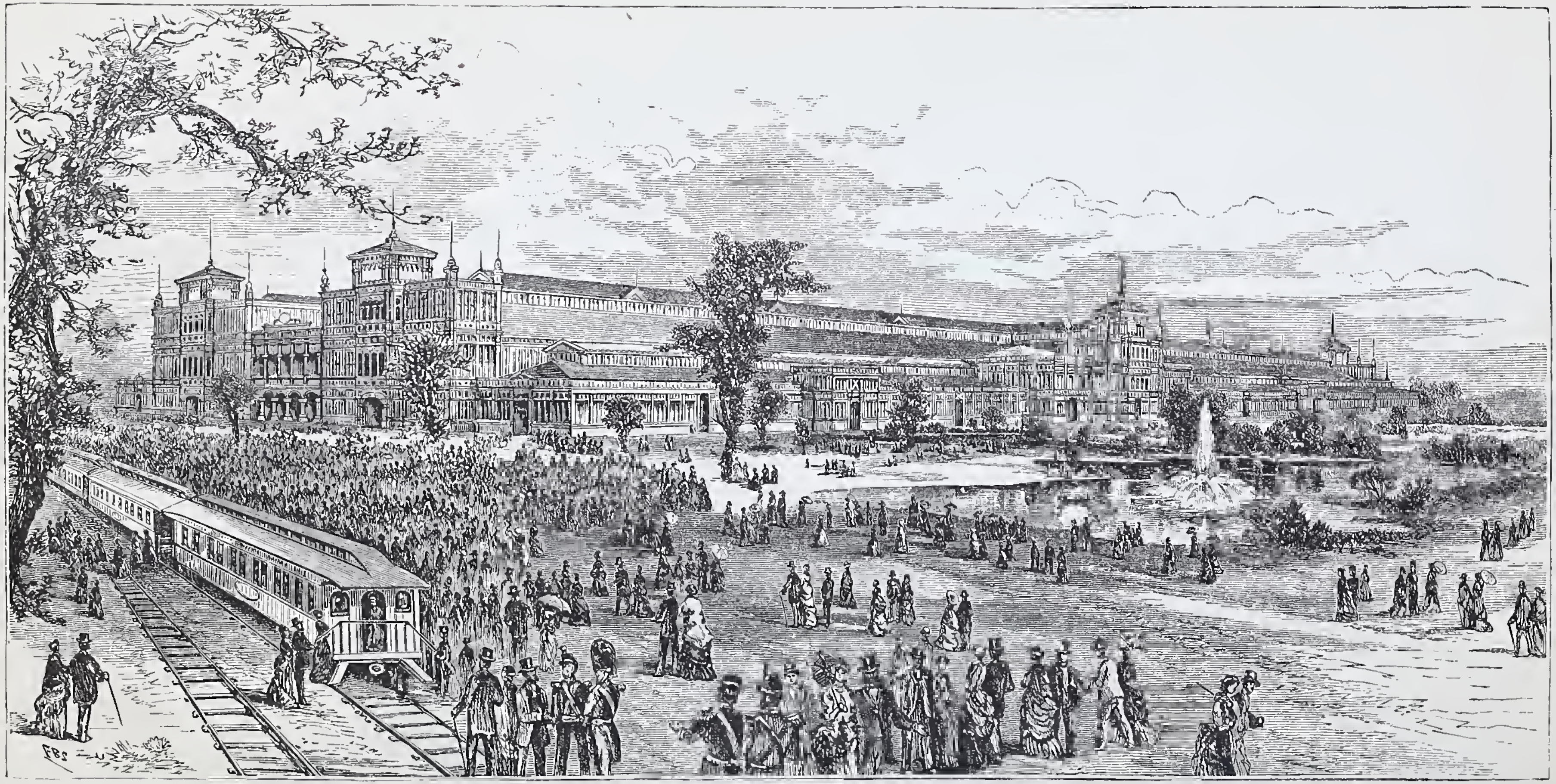
NUMBER OF EXHIBITS.

NATIONS.	Pictures and Drawings.	Sculptures.	Art Applied to Industries.	Groups of Photographs.	Total.
United States	1,211	103	128	1,307	2,749
Great Britain	248	14	63	108	433
France	404	70	30	271	775
Germany	157	12	15	396	580
Austria	150	8	8	187	353
Spain	152	27	34	40	253
Italy	127	324	62	....	513
Pope Pius IX	....	....	5	....	5
Belgium	177	43	69	52	341
Netherlands	160	1	6	36	203
Denmark	15	....	....	....	15
Sweden	75	2	3	70	150
Norway	52	5	....	16	73
Russia	65	8	7	127	207
Canada	156	....	....	127	283
Mexico	57	5	....	7	69
Brazil	16	5	1	45	67
Argentine Republic	34	....	....	14	48
Australia	....	....	....	20	20
Japan	....	....	....		2
Uruguay	....	....	....	8	8
Total	3,256	627	431	2,833	7,147

Number of Individual Exhibitors.

NUMBER OF INDIVIDUAL EXHIBITORS.

NATIONS.	Painting, etc.	Sculpture.	Art Applied.	Photography.	Total.
United States	463	63	117	144	787
Great Britain	169	9	31	38	247
France	220	40	2	7	269
Germany	100	11	15	32	158
Austria	86	7	2	18	113
Spain	90	20	....	22	132
Italy	58	84	21	2	165
Pope Pius IX	....	....	1	....	1
Belgium	124	12	8	1	145
Netherlands	111	1	4	2	118
Denmark	8	....	....	....	8
Sweden	69	1	3	9	82
Norway	36	3	....	....	39
Russia	40	5	6	8	59
Canada	33	....	....	12	45
Mexico	44	4	....	1	49
Brazil	13	4	....	7	24
Argentine Republic	12	....	....	7	19
Australia	....	....	....	2	2
Japan	....	....	....	2	2
Uruguay	....	....	....	8	8
Total	1,676	264	210	322	2,472



Machinery Hall.

MACHINERY.

DEPARTMENT V OF THE CLASSIFICATION.

Organization of the Bureau.

The Bureau of Machinery was organized March 1, 1875, its original administration extending only to the allotment of space to Exhibitors and the superintendence of Machinery Hall. Subsequently it took charge of all buildings within the space bounded by Elm, Belmont, and Fountain Avenues, and the Avenue of the Republic.

Classification of machinery.

In allotting space, the dual system of classification and arrangement was adhered to as far as practicable. A special group was added, which included all machinery, apparatus, and tools especially adapted for use in this Department. Steam engines, boilers, pumps, cranes, and tools, amounting in value to $159,221, were furnished by Exhibitors free of charge.

Motive power.

Contract with Geo. H. Corliss.

In January, 1875, the important question presented itself of providing the necessary motive power to drive the main lines of shafting. Various propositions bearing on this subject were considered and abandoned, but finally on the 4th June of that year, with the approval of the Centennial Commission, the Board of Finance made a contract with Mr. George H. Corliss,* of Providence, R. I., whereby that gentleman undertook, for the sum of $77,000, to furnish engines and boilers of 1,400 horse-power, steam-pipes, main underground shafting, with the necessary gearing and pulleys, to drive eight main lines of shafting in Machinery Hall, and to bear all the expenses of building, transporting, erecting and operating the same during the Exposition. The Board of Finance agreed to do the excavating, build the boiler-house, and supply the fuel at its own expense. The main underground line of shafting was afterwards extended to drive the line shaft in the Hydraulic Annex, for which an additional sum of $1,000 was allowed. Although the time for constructing machinery of such size was very limited, yet, on the day appointed, the engines were started, and from that time until the Exposition closed were never stopped for repairs or adjustment during the hours they were required to be in operation.

Description of Corliss engine.

The Corliss Engine—in its line the great wonder of the Exhibition—consisted of a pair of condensing over-head beam-engines of 1,400 horse-power, which was transmitted through a fly-wheel 30 feet in diameter, by means of spur-gearing, to a pinion 10 feet in diameter, fixed on the main shaft, 352 feet in length. The shaft was situated in the transept, below the floor, and extended from the Hydraulic Annex across the Machinery Building. At four different points on the shaft were nests of three bevel-wheels, each 6 feet in diameter, transmitting the power to shafts having a direction at right angles to the main line, and running longitudinally with the building. On the ends of these longitudinal shafts were eight driving-pulleys; seven of these were 8 feet, and one was 9 feet in diameter, all 23 inches wide on the face. Directly over the driving-pulleys were the pulleys on the ends of the eight main lines of shafting, seven of 7 feet and one of 4 feet in diameter, and all of them 32 inches wide on the face; double leather belts, 30 inches wide, were used for driving them; the main underground shaft leading to the Hydraulic Annex also carried a pulley 6 feet in diameter, 26 inches wide on the face, and drove a belt 22 inches wide. By means of tightening-pulleys the desired amount of tension could be put on the belts, or the shafts could be stopped independently of the engines. The engines were set on heavy iron frames imbedded in brick foundations, and a platform 55 feet in diameter, raised 3½ feet above the floor of the building, covered them, and inclosed the condensers, air-pumps and pinion ·

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* This gentleman was the Centennial Commissioner from Rhode Island, and through his energy, enterprise, and liberality, contributed largely in advancing the interests of the Exhibition.

Boilers.

There were twenty Corliss upright fire tubular boilers of 70 horse-power each, 4 feet in diameter and 14 feet in length, placed side by side, and set in brick-work. Steam was conveyed to the engines through a double-riveted wrought-iron steam-pipe, of 18 inches diameter and 320 feet in length, which was carried through an underground passage extending from the boiler-house to the engines.

Dimensions and weight of engines.

The following are the dimensions and weight of the principal parts of the engines:

Diameter of cylinders	40 in.
Stroke of piston	10 ft. 0 "
Diameter of steel piston-rods	6¼ "
Revolutions of engines per minute	36
Total revolutions made during the Exhibition	2,355,300
Length of beams between centres	25 ft. 0 in.
Depth of beams at centres	9 " 0 "
Weight of each beam	11 net tons.
Length of crank shaft	12 ft. 0 in.
Diameter of crank shaft	1 " 7 "
Diameter of crank shaft at bearings	1 " 6 "
Length of crank shaft at bearings	2 " "
Diameter of fly-wheel at pitch line	29 " 8⅜ "
Pitch of teeth	5.183 "
Width of fly-wheel across the face	2 ft.
Weight of fly-wheel	56 tons.
Number of teeth on fly-wheel	216
Diameter of pinion at pitch line	9 ft. 10¾ in.
Weight of pinion	8½ net tons.
Total weight of engines, shaftings, boilers, and attachments	7

Cost of motive-power.

In addition to the $77.000 paid to Mr. Corliss, the cost of this motive-power was $65,374, making a total of $142,374. It appears, however, by a statement of Mr. Corliss, that his actual expenses were $40,788.10 in excess of the amount paid him by the Commission.

Shafting.

The main lines of shafting were provided under various contracts.

The total cost of the shafting was $25,785.92, and its total length 5,870 feet.

Additional boiler-power.

The numerous applications of Exhibitors for steam created the necessity of providing additional boiler-power. Twenty different firms, anxious to exhibit their machinery in actual operation, accordingly offered boilers for exhibition and use, and in this manner 1,720 horse-power was obtained free of cost, the Commission being at the expense only of setting the boilers, making the pipe connections, and providing fuel and attendants. Eight boilers of 560 horse-power were loaned by Mr. Corliss, and connected with the main steam-pipe in the Hydraulic Annex, thus increasing the steam supply to 2,280 horse power,—the total amount of power from all of the boilers being 3,120 horse-power.

Demand for space.

Special buildings.

The demand for space exceeded the capacity of Machinery Hall as early as November 30, 1875. Special buildings, therefore, became a necessity. A number of these were erected at the expense of the Board of Finance, to be used as boiler-houses and as places in which to display machines of a dangerous or objectionable character. These structures were located and constructed so as to prevent disastrous effects to the other buildings in case of fire or explosions. A number of special buildings for the exhibition of machinery were erected at the expense of the Exhibitors themselves. Fourteen engines, on exhibition for use, and varying from 10 to 250 horse-power, the total amounting to 840 horse-power, operated the machinery in these special buildings.

Water supply.

The maximum daily supply of water to the boilers, and to the Corliss engines for condensing the steam, amounted to 600,000 gallons, of which 100,000 gallons were supplied directly from the mains to the boilers, and 500,000 gallons were used for condensing the steam in the Corliss engines.

Steam-pipes.

The total cost of the steam-piping was $18,779.50, and its length 6,268 feet; the cost of the feed and blow-off pipes of the boilers, 2,704 feet in length, being included in this sum.

Telegraphic signals.

Signals could be instantly transmitted through a system of electric wires, and a shaft stopped in case of an accident without stopping the engine or the other shafts.

Organization of the staff.

From the organization of the Bureau in March, 1875, until a short time previous to the opening of the Exhibition, the force of officers and assistants was gradually increased. In April, 1876, a permanent organization was made which continued until after the close of the Exhibition, 21 officers constituting the staff, with 8 clerks. The Engine-Tenders, Pump-Tenders, Firemen, Coal-Passers, Oilers, Carpenters, Machinists, Plumbers, Storekeepers, Quartermasters, Janitors, Assistant Janitors, Sweepers and Laborers, made the total list 137.

Permits for space.

The first Permits for Space were issued October 27, 1875. Machinery Hall was completed January 5, 1876, and the Exhibitors' spaces marked off on the floor.

Installation of exhibits.

The installation of Exhibits commenced about the 15th of January. In this connection, the following tables will be found both interesting and valuable:

NUMBER OF EXHIBITORS IN MACHINERY DEPARTMENT.

Exhibitors in Machinery Department.

BUILDINGS.	United States.	Great Britain.	Canada.	France.	Germany.	Belgium.	Russia.	Brazil.	Sweden.	Austria.	Spain.	Italy.	Switzerland.	Chili.	Total.
Machinery Building and Hydraulic Annex	1,210	97	42	50	46	35	119	57	20	8	2	1	4	...	1,691
Shoe and Leather Building	488	10	1	......	9	.....	27	.....	......	...	...	...	...	...	535
Annexes and Special Buildings	88	3	1	......	......	......	2	.....	......	...	...	...	...	1	95
Totals	1,786	110	44	50	55	35	148	57	20	8	2	1	4	1	2,321

EXHIBITS BY STATES.

Exhibits by States in Machinery Department

STATE.	Value of Exhibits.	Cost of Exhibiting.	Total Value and Cost.	Number of Exhibits in Machinery Buildings.	Number of Exhibits in Shoe and Leather Department.	Total Number of Exhibits.	Number of Exhibitors in Machinery Buildings.	Number of Exhibitors in Shoe and Leather Department.	Total Number of Exhibitors.
Alabama	$40 00	$50.00	$90.00	....	5	5	....	1	1
California	160.00	743 00	903 00	2	30	32	1	2	3
Connecticut	133.946.21	97,617.40	231,563.61	3,258	7	3,265	60	3	63
Delaware	27,676 99	8,240.82	35,917.81	352	274	626	14	7	21
District of Columbia	3,178.00	1,551 50	4,729 50	11	2	13	9	2	11
Illinois	42,632 50	47,376 15	90,008 65	830	182	1,012	25	8	33
Indiana	15,181.70	4,140.00	19,321 70	134	99	233	7	4	11
Iowa	2,860.00	3,610.00	6,470.00	16	....	16	11	....	11
Kentucky	2,300.88	3,430 84	5,731 72	29	305	334	3	8	11
Maine	8,461 00	6.456.26	14,917.26	48	60	108	18	1	19
Maryland	6,020.09	3,976.48	9,996.57	109	372	481	21	14	35
Massachusetts	425,955.12	179,964 17	605,919.29	3,481	5,614	9,095	138	112	250
Michigan	10,339.00	6,133 93	16,472 93	45	50	95	20	2	22
Minnesota	250.00	565.70	815.70	4	....	4	....	....	....
Missouri	16,425.30	3,567.00	19,992.30	14	10	24	5	2	7
Nebraska	850 00	400.00	1,250.00	....	7	7	....	1	1
Nevada	17,400.00	2,600 00	20,000.00	10	....	10	2	....	2
New Hampshire	31.979.00	11.310.35	43,289.35	164	58	222	13	3	16
New Jersey	127,406.00	30,406 35	157,812.35	853	3,598	4,451	70	39	109
New York	643,327.32	277,160 25	920,487 57	4,437	5,225	9,662	326	100	426
Ohio	55,020.35	39,286.75	94,307.10	719	217	936	45	19	64
Pennsylvania	899 934.73	290,451 31	1,190,386 04	44.393	5,267	49,660	466	147	613
Rhode Island	192,603.55	63,910 68	256,514.23	2,349	602	2,951	25	4	29
South Carolina	30,300 00	5,100 00	35,400 00	3	....	3	2	....	2
Tennessee	125 00	85.00	210.00	....	18	18	....	2	2
Texas	270 00	794 75	1,064.75	5	3	8	1	1	2
Vermont	51.078 78	19,380 96	70,459.74	421	3	424	7	1	8
Virginia	10,040.00	9,100 00	19,140.00	10	3	13	1	1	2
West Virginia	44.00	16.93	60 93	....	10	10	....	1	1
Wisconsin	9,521.70	6.196.84	15,718.54	32	34	66	8	3	11
	$2,765,327.22	$1,123,623.42	$3,888,950 64	61,729	22,055	83,784	1,298	488	1,786
Special Machinery used during Exhibition.									
England	28,780 00	1,000 00	29,780 00						
Russia	260.00	75.00	335 00						
Totals	$2,794,367.22	$1,124,698.42	$3,919,065.64						

Tests of Machinery.

During the last three months of the Exhibition, a large number of boilers, water-wheels, steam fire-engines and other machines, were tested under the direction of competent experts, and many interesting reports made thereon.

Manufacturing processes.

The various processes of manufacturing, as shown by Exhibitors on their machinery, not only enhanced the interest to visitors, but proved quite a source of revenue to the Board of Finance. The receipts from concessions to restaurants, and the percentage on articles manufactured and sold in the Machinery Department during the six months of the Exhibition, were as follows:

Receipts.

Amount received on sales of goods in Machinery Hall	$50,000.00
" " " " " Special Buildings	14,532.78
" " from concessions to Restaurants	18,500.00
	$83,032.78

Running expenses.

These receipts were almost equal to the running expenses, whic amounted, during the same period, to $85,666.09, including the cost of coal, gas, salaries, and repairs to the buildings.

Administration of Bureau.

The Bureau of Machinery was under the able supervision of Mr. John S. Albert, Chief Engineer United States Navy. The officers of his staff were as follows: *Secretary*, Nahum Stetson. *Aids*, J. Gardner Sanderson, Frederick Ungurer. *Superintendent of Allotment of Space and in Charge of Office,* Lewis W. Robinson, Passed Assistant Engineer United States Navy. *Assistant to Superintendent*, Engineer Henry Fairfax. *Clerks*, James H. Mooney, Charles R. Seaman, Jesse Osmond, W. F. May. *Messengers*, Henry Drummond, Charles Warden. *Superintendent of Machinery Building and Installation of Machinery*, Joseph Hirst. *Assistants to Superintendent*, Engineer Wilson K. Purse, Passed Assistant Engineer United States Navy; Engineer Philip Voorhees, Engineer George A. Woods, Engineer George B. Hubbard, Engineer John Cotter. *Engineer in Charge of Shafting*, James Hodson. *Superintendent in Charge of Buildings South of Machinery Building*, John T. Hawkins. *Assistant to Superintendent*, Engineer Philip Pistar. *Clerk*, Jacob Ridgeway. *Superintendent of Boilers and Steam Pipes*, J. D. Norton. *Assistant to Superintendent*, Engineer J. C. Kilgore. *Superintendent of Buildings West of Machinery Building*, William A. Dripps. *Assistants to Superintendent*, Engineer J. D. Curtis, Assistant Engineer E. P. Roberts, Percy A. Sanguinetti, Chief Draughtsman, E. F. Tolman, Draughtsman.

AGRICULTURE.

DEPARTMENT VI OF THE CLASSIFICATION.

Bureau of Agriculture.

Officers.

The Bureau of Agriculture was organized February 25, 1875, the Executive officers being as follows: *Chief of Bureau*, Burnet Landreth. *Chief Clerk*, C. Henry Roney *General Superintendent*, John Wilkinson. *Superintendent of Agricultural Machinery Section*, Thomas G.

JANVIER. *Superintendent of Miscellaneous Section*, H. S. MOORHEAD. *Superintendent of Motive-Power*, BYRON DANBY. *Superintendent of Butter and Cheese Building*, D. L. PAPE. *Superintendent of Brewery*, THEODORE BERGNER *Superintendent of Field Trials and Live Stock Exhibition*, JAMES GEDDES. *Superintendent of September Pomological Exhibition*, G. B. BRACKETT. *Assistant Superintendent of Live Stock Exhibition*, EDWARD R. SHARWOOD. *Superintendent of Bench Show*, CHARLES LINCOLN. *Superintendent of Poultry*, JOHN E. DIEHL. *Superintendent of Aquaria*, FRED. MATHER. *Assistant Superintendent*, W. M. LOCKE.

Advisory Committee.

The following gentlemen, selected on account of their technical qualifications upon the several subjects comprised within the scope of the Bureau, constituted the Advisory Committee: A. L. KENNEDY, M. D., WILLIAM B. ROBERTS, GEORGE BLIGHT, GEORGE I. YOUNG, ELI SLIFER, SAMUEL THORNE, JOHN D. WING, S. D. BRUCE, HORACE J. SMITH, JACOB R. EBY, WILLIAM BRICE, CHARLES L. SHARPLESS, SAMUEL C. WILLITS, L. HENRY TWADDELL, M. D., JOHN B. SCOTT, A. J. ALEXANDER, CHARLES R. KING, M. D., LEWIS WELDIN, THADDEUS NORRIS, JOHN I. BISHOP, MARSHALL P. WILDER, JOHN A. WARDER, M. D., P. J. BERCKMANS. C. HENRY RONEY, *Secretary*.

Applications for space.

Delivery of objects.

Installation.

Courtesy shown to foreign exhibitors.

Available space.

Fifty-nine applications for space were referred to the Bureau at the time of its organization, and this number rapidly increased as the preparations for the Exhibition became better known. Few objects were delivered, however, before April 15, 1876, and the installation continued until the end of June. As a matter of courtesy, and to expedite the preparations of the Foreign Commissions, the allotment of space to foreign countries was made before any assignment to home Exhibitors. After deducting the main avenues, the available exhibiting space in the Agricultural Building was 250,924 square feet, of which allotments were made to foreign countries as follows:

Allotments of space to foreign countries.

	Sq. feet.		Sq. feet.
Canada	10,387	Portugal	6,182
England	12,224	Germany	4,878
Brazil	4,668	Austria	2,392
Denmark	806	Norway	3,090
Italy	4,280	Spain	6,061
Russia	6,893	Japan	1,665
Liberia	1,536	Sweden	2,603
Venezuela	1,220	Netherlands	4,276
France	15,743	Argentine Republic	3,468

This aggregated 92 372 square feet, or 37 per cent. of all the available exhibiting space.

Distribution of space.

The final allotment gave to the Foreign Division $36\frac{4}{10}$ per cent. of the area of the entire building; to the Machinery Section, $30\frac{2}{10}$ per cent.; and to the Miscellaneous Section, $33\frac{4}{10}$ per cent. The arrangement of passage-ways and exhibition spaces, and the location of

Foreign and American Divisions, are shown on the ground-plan of the building.*

Fountains.

Stands for soda-fountains, etc.

A considerable portion of the area at the intersection of the nave and centre transept was occupied by an iron fountain, 60 feet in diameter, and other spaces by soda-fountains, stands for the sale of photographs, official catalogues, and flowers, a telegraph office, spaces for rolling-chairs, and during the spring and autumn, by tables for the display of pomological products.

Agricultural products.

Agricultural products were installed in the nave and the western side of the building, from the north and southwardly to the middle transept.

Agricultural machinery.

Agricultural machinery was located east of the nave, from the north end of the building southwardly to the Canadian Section.

Steam-power.

Boilers.

Pipes.

Steam pressure.

Engines employed

Transmission of the steam-power

Distribution of power.

The steam-power used was supplied from two of Anderson's sectional boilers, manufactured by P P. Mast & Co., of Springfield, Ohio, located in the Boiler-House, situated 200 feet east from the Agricultural Building. The boilers were fed by a Knowles steam-pump, the water being drawn from the city water main. The steam was conveyed to the two engines through wrought-iron pipes inclosed in a wooden trunk, and placed beneath the surface of the ground, the main steam-pipe being 6 inches in diameter and 170 feet long; then branching off to the right and left with 5-inch diameter pipes 100 feet to each engine, making a total length of 370 feet of subterranean steam-pipe. The average steam pressure at the boilers was 42.12 lbs. per square inch; the pressure at engines after transmission through the pipes 39.13 lbs.,—a loss of pressure of 4.7 per cent. The boilers were in service 135 days, an aggregate of 1,127 hours, at an average consumption of 483 pounds of coal hourly. The power used was derived from two engines of 80 and 120 horse-power respectively, located in annexes on the east side of the building; the smaller engine, a vertical high pressure, built by Neafie & Levy, Philadelphia; the larger, a horizontal high pressure engine, built and exhibited by Jerome Wheelock, of Worcester, Massachusetts. The fly-wheel of the horizontal engine was 14.08 feet in diameter and 25.5 inches face. It weighed 14,000 pounds, and made 55.39 revolutions per minute, and 3,210,412 revolutions in the aggregate. The fly-wheel of the vertical engine was 10 feet in diameter, with 20 inches face. It weighed 8,117 pounds, and made 78 revolutions per minute, and 4,520,880 in the aggregate. The power from the vertical engine was transmitted from the pulley fly-wheel, by an overhead counter-pulley 78 inches in diameter, running at a speed of 120 revolutions per minute, to a main line of shafting 180 feet in length with the same speed, and then 60 feet beyond, to a second line of the same length, and having a speed of 240 revolutions per minute. The power from the horizontal engine was transmitted in similar manner and speed to the first main line, making 120 revolutions per minute, the second line in this case also being driven at 120 revolutions. The power was distributed from the four main lines of shafting to the various spaces of Exhibitors at their own expense.

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* See Ground-Plan of Agricultural Hall, Vol. I., INTRODUCTION, *post*.

The engines were stopped but twice during the running time of the six months,—once for fifteen minutes, and again for thirty minutes, because of the derangement of the belts by damp weather.

Collective displays by States.

The following States made collective displays in Agricultural Hall of their natural and cultivated products:

	Sq. ft.		Sq. ft.
Connecticut	480	Nebraska	705
Delaware	286	New Hampshire	360
Illinois	501	New Jersey	912
Indiana	501	Ohio	350
Iowa	1,566	Oregon	591
Massachusetts	760	Washington Territory	288
Michigan	1,235	Wisconsin	480
Missouri	501		

Stated displays.

Various stated displays were held under the auspices of the Agricultural Bureau. The field trials of agricultural machinery were held on grounds procured for that purpose, and though not competitive, they were of an interesting and valuable character.

Hay-making machinery.

The display of hay-making machinery took place at Eddington Station, on the Pennsylvania Railroad, fourteen miles from Philadelphia. The area of the field was fifty-one acres, divided into as many sections. The Exhibition began June 27th, and continued four days.

Reaping machines.

The wheat-field, in which reaping machinery was tested, was situated two miles above the mowing field, and contained forty-seven acres, divided into forty-four one-acre sections, separated by passage-ways of six feet in width. This display began July 5th, and lasted three days.

Thrashing machines.

The trial of thrashing machines began July 18th, and continued five days, the material used being wheat cut at the trial of reapers. Each of several manufacturers thrashed and cleaned 2,000 pounds of straw in less than fifteen minutes.

Cost of field exhibitions.

The total expense of the three field Exhibitions, including rent, fertilizers, salaries, and providing necessary facilities, was $4,200.

Dairy exhibition.

The Dairy Exhibition was divided between Agricultural Hall, which held most of the machinery and apparatus, and the Butter and Cheese Building, in which were shown the products, the area assigned for the display of the latter being 6,608 square feet, divided as follows: For foreign cheese. 1,680 square feet; for American cheese, 2,520 square feet; for butter, foreign and domestic, 840 square feet; for cheese apparatus, 728 square feet; for butter apparatus, 840 square feet.

Display in Brewers' Hall.

The machinery and materials used in the brewing of malt liquors were displayed in Brewers' Hall. The structure comprised 26,112 square feet on the main floor, and 5,600 in an ice-house, a total area of 31,712 square feet; of which 23,552 square feet were occupied by Exhibitors.

Farm wagons, etc.

The Wagon Building contained wagons for farm and commercial purposes, there being 34 Exhibitors, with 119 objects, the value of which as $22.500.

Fruits.

The Pomological Annex was erected especially for the exhibition of fruits, the area of the building being 34,571 square feet, equally divided between Exhibition tables and passages. The display began on the 16th of May, and continued without intermission until the close of the Exhibition. The United States and Canada vied with each other in the excellence of their Exhibits, which required over 12;000 dishes in their presentation. The Judges examined over 2,000 different displays of fruit.

Live-stock.

The Live-Stock display was made in a section of ground at the corner of Belmont Avenue and the Pennsylvania Railroad, running eastwardly to Forty-first Street, and containing twenty-one acres. Every necessary convenience for the comfort, protection, and exhibition of the animals was made.

Poultry.

The Poultry Display was held in the Pomological Hall, the exhibition of fruit having been removed to the centre aisles of the Agricultural Building.

Dogs.

The Bench Show of 538 Dogs was held during the Horse Exhibition, and attracted great attention.

The following tables relative to the displays in the Agricultural Department will be found interesting and valuable:

FOREIGN EXHIBITORS.

Foreign exhibitors.

	Arboriculture and Forest Products.	Pomology.	Agricultural Products.	Live-Stock.	Marine Products.	Food Products.	Textiles.	Agricultural Machinery.	Agricultural Administration.	Agricultural Systems.	Miscellaneous.	Total.
Great Britain........	3	......	6	15	1	83	7	21	6	......	11	153
New Zealand.........	......	......	1	......	......	1	......	......	......	......	......	2
New South Wales...	......	......	......	......	......	9	......	......	......	......	......	9
South Australia......	......	......	......	......	......	......	......	1	......	......	3	4
Cape of Good Hope.	......	......	2	......	......	2	7	......	......	......	......	11
Jamaica..............	......	......	......	......	......	1	......	......	......	......	......	1
Canada.................	4	......	5	107	15	165	4	47	3	1	12	363
France.................	3	......	7	......	12	166	5	47	7	......	40	287
Germany..............	3	......	10	......	1	145	2	5	3	1	1	171
Austria.................	6	......	8	......	1	64	8	5	2	......	......	94
Netherlands..........	3	......	10	......	1	45	5	3	4	1	1	73
Sweden.................	1	......	19	......	11	47	......	4	11	2	......	95
Norway................	4	......	14	......	18	49	......	9	4	1	......	99
Italy.....................	17	1	1	......	2	233	2	8	3	1	1	269
Brazil....................	210	......	271	......	1	218	99	5	2	......	10	816
Argentine Republic.	130	......	350	......	5	373	137	9	2	16	2	1,024
Liberia..................	2	......	2	......	......	65	3	1	......	......	......	73
Portugal...............	105	......	402	......	9	1,255	105	......	3	......	1	1,880
Russia..................	8	......	87	......	8	202	34	7	3	......	......	349
Japan....................	4	......	47	......	4	17	9	1	......	......	3	85
Spain....................	85	......	687	......	20	1,405	128	6	7	1	......	2,339
Philippine Islands..	20	1	34	......	5	62	57	2	......	......	......	181
Venezuela.............	......	......	......	......	......	......	......	......	......	......	58	58
Denmark..............	......	......	14	......	......	......	......	......	......	......	......	14
Bermuda...............	......	1	......	......	1	......	......	......	......	......	......	2
Totals..............	608	3	1,977	122	115	4,607	612	181	60	24	143	8,452

United States exhibitors and exhibits

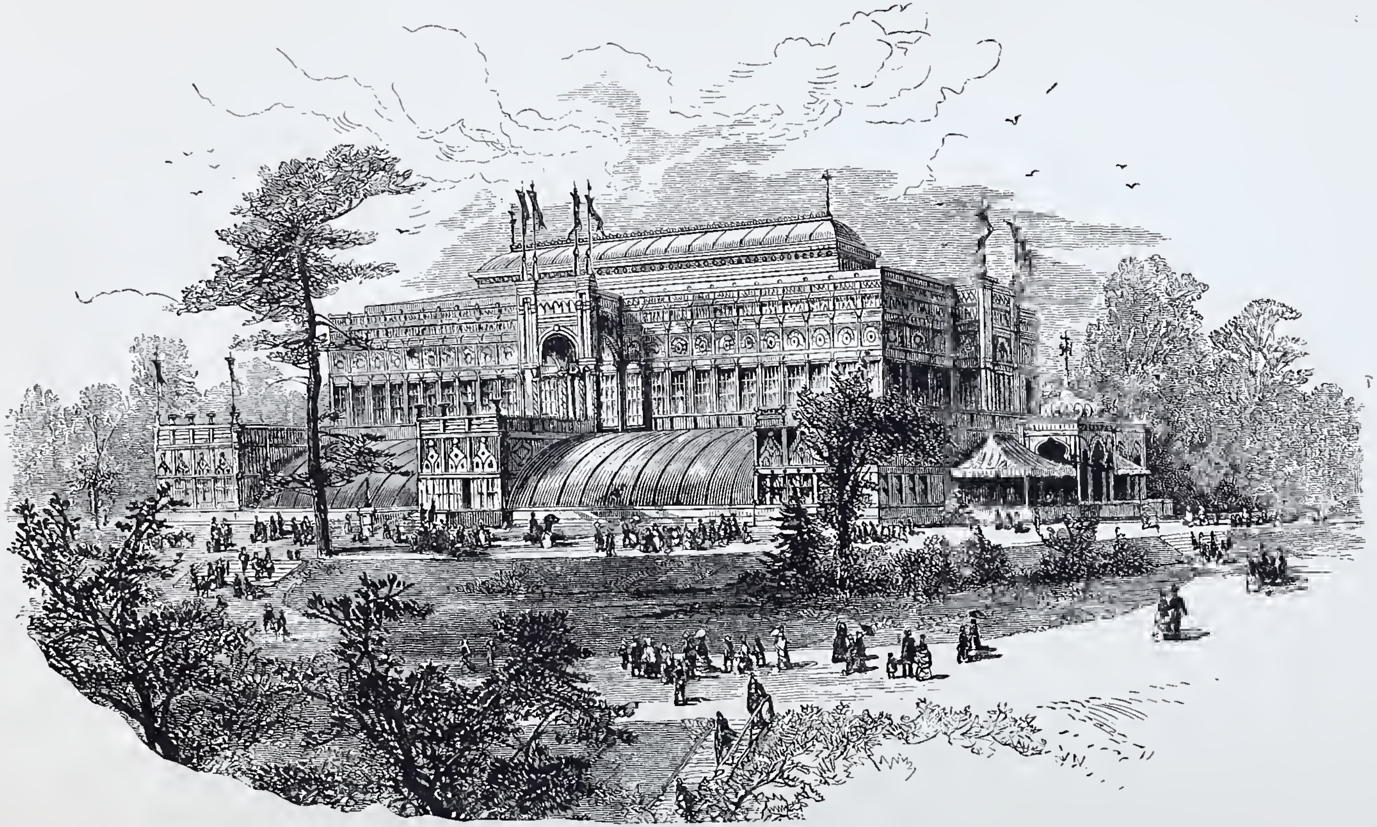
UNITED STATES EXHIBITORS.

	Machinery.	Miscellaneous.	Brewery.	Pomology.	Dairy.	Live-Stock.	Boiler-House.	Wagon Building.	Agricultural Grounds.	Total.
Alabama		6								6
Arkansas		2								2
California		49	4	2						55
Colorado						1				1
Connecticut	16	11		17		20			1	65
Delaware	2	22	1	7		7		1		40
Florida		6								6
Georgia		1			3					4
Illinois	20	22	12	1		9		3	4	71
Indiana	8	16	2	1		1		3		31
Iowa	5	17		2	6	4				34
Kansas		12				1				13
Kentucky	6	7		1		1				15
Louisiana		9		2				1		12
Maine	3	7	1	1		4				16
Maryland	8	14	4	1		21				48
Massachusetts	22	39	8	47	3	14				133
Michigan	13	26	2	4		4		2	1	52
Minnesota	3	7		3						13
Mississippi	1	5								6
Missouri		7	7		3	3				20
New Hampshire	6	6	1			3				16
North Carolina	1	6		1		1				9
Nevada		1								1
Nebraska		1		5		1				7
New Jersey	20	54	2	8		82			1	167
New York	67	186	153	21	97	91	1	4	1	621
Ohio	45	45	8	3	12	7	1	3		124
Oregon		22		6						28
Pennsylvania	101	266	52	40	15	321		15		810
Rhode Island		2				4				6
South Carolina		13				3				16
Tennessee		5								5
Texas		3		1						4
Vermont	1	9		1	12	5				28
Virginia		13		2		1				16
West Virginia	1									1
Wisconsin	9	22	8	2	130	4		2	2	179
District of Columbia				2						2
Montana Territory		1								1
Washington Territory		1								1
Totals	358	941	265	181	281	613	2	34	10	2,685

Numbers and values of live-stock.

SUMMARY OF NUMBERS AND VALUES OF LIVE-STOCK EXHIBITED.

CLASSIFICATION.	Number of American Exhibitors.	Number of American Animals.	Number of Foreign Exhibitors.	Number of Foreign Animals.	Values.
Horses	66	135	51	58	$273,500
Horned Cattle	57	349	26	63	177,400
Sheep	27	346	10	125	75,177
Swine	11	154	6	30	23,560
Poultry	183	2,590	23	515	31,050
Dogs	269	532	6	6	29,810
Totals	613	4,106	122	797	$610,497



Horticultural Hall.

Number of exhibitors.

From these tables the number of Exhibitors in the Agricultural Department appears to be: Foreign, 8,452; American, 2,685; Total, 11,137.

Value of American exhibits.

The value of American Exhibits in the Agricultural Department, exclusive of Live-Stock,* has been given as $710,994. The value of Foreign Exhibits is unknown.

Passes.

The number of photograph tickets issued by the Bureau for the Agricultural Building and Annexes were 1,091 to Exhibitors, 906 to attendants, and 77 to employés; and on account of the Live-Stock Exhibition, 502 to Exhibitors, and 414 to attendants; a total of 2,990 passes.

Office force.

The force of draughtsmen, clerks, janitors, and others varied with the exigencies of the Exhibition, the total number of days' service of superintendents being 2,099, of draughtsmen 1,602, of clerks 3,050, and of janitors, engineers, machinists, gas-lighters, and others 6,751.

Excellence of the Agricultural display.

The theoretical and practical knowledge of Agriculture possessed by Capt. LANDRETH, the Chief of this Bureau, with the business tact and executive ability of his Chief Clerk, Mr. C. HENRY RONEY, will account for the excellent arrangements and interesting display made in the Agricultural Department.

HORTICULTURE.

DEPARTMENT VII OF THE CLASSIFICATION.

Bureau of Horticulture.

The Bureau of Horticulture, of which Mr. CHARLES H. MILLER was Chief, comprised the duties of superintending the Horticultural Department, Conservatory, and Grounds, and the allotment of space to Exhibitors.

Exhibits in the Hall and Annex.

Exhibits in the grounds.

Foreign countries represented.

Attractive features.

A general idea of the location of the various Exhibits may be obtained by reference to the Ground-Plan of the Building and Annex.† Surrounding the Hall, and near the centre of the Exposition enclosure, is an allotment of forty acres of ground for the display of tropical plants and garden decorations. The Exhibits comprised the representative trees of this country, forest and ornamental trees, plants of commerce, and new plants of recent introduction from China, Japan, and other foreign climes. England, France, Belgium, Germany, the Netherlands, Brazil, Spain, Portugal, and Mexico were represented in this department. The walks in and around the allotment aggregated a distance of over three miles in length, and amongst other attractive features was a beautiful parterre illustrating the various methods of ornamental flower-gardening.

The following tables in reference to this beautiful and interesting Exhibit are self-explanatory:

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* The total value of Live-Stock Exhibits, both American and Foreign, is shown by the Summary to be $610,497.

† See Vol. II, INTRODUCTION, *post.*

Exhibitors and Exhibits.

Countries.	Horticultural Building Number of Square Feet..........41,641 Devoted to Passage-ways..........19,079			Horticultural Annex. Number of Square Feet..........7,500 Devoted to Passage-ways..........1,300			Horticultural Grounds. Number of Square Feet..........342,333 Devoted to Passage-ways..........59,660		
	Number of Square Feet occupied by Exhibitors.	Number of Exhibitors.	Number of Objects Exhibited.	Number of Square Feet occupied by Exhibitors.	Number of Exhibitors.	Number of Objects Exhibited.	Number of Square Feet occupied by Exhibitors.	Number of Exhibitors.	Number of Objects Exhibited.
England.........	1,050	3	239	6,200	1	1,500	8,000	2	1,801
Jamaica.........	320	1	250	....	......	....	....	......	....
Bermuda.........	50	1	2	....	......	....	....	......	....
Victoria.........	330	1	148	....	......	....	....	......	....
New Zealand..	50	1	50	....	......	....	....	......	....
Sandwich Isl'ds	50	1	80	....	......	....	....	......	....
St. Domingo....	75	1	12	....	......	....	....	......	....
France...........	100	1	25	....	......	....	17,500	3	4,164
Spain.............	1,840	4	427	....	......	....	8,500	2	2,038
Germany........	120	1	64	....	......	....	....	......	....
Netherlands..	....	......	....	....	......	....	6,700	2	1,557
Austria..........	....	......	....	....	......	....	800	1	30
Luxemburg....	....	......	....	....	......	....	2,000	2	1,200
United States...	18,577	97	3,877	....	......	....	239,173	56	64,869
Total..........	22,562	112	5,174	6,200	1	1,500	282,673	68	75,959

OBJECTS EXHIBITED AND THEIR VALUES.

Value of Exhibits.

Objects.	Number of Objects.	Value.	Expenses borne by Exhibitors
Plants exhibited..	75,498	$47,863	$14,847
" loaned..	113	2,570	....
" presented..	932	5,550	....
" purchased..	47,772	4,435	....
" propagated..	10.000	1,300	....
Horticultural implements, garden appliances, etc..	6,835	39,568	13,311
Total..	141,150	$101,286	$28,158

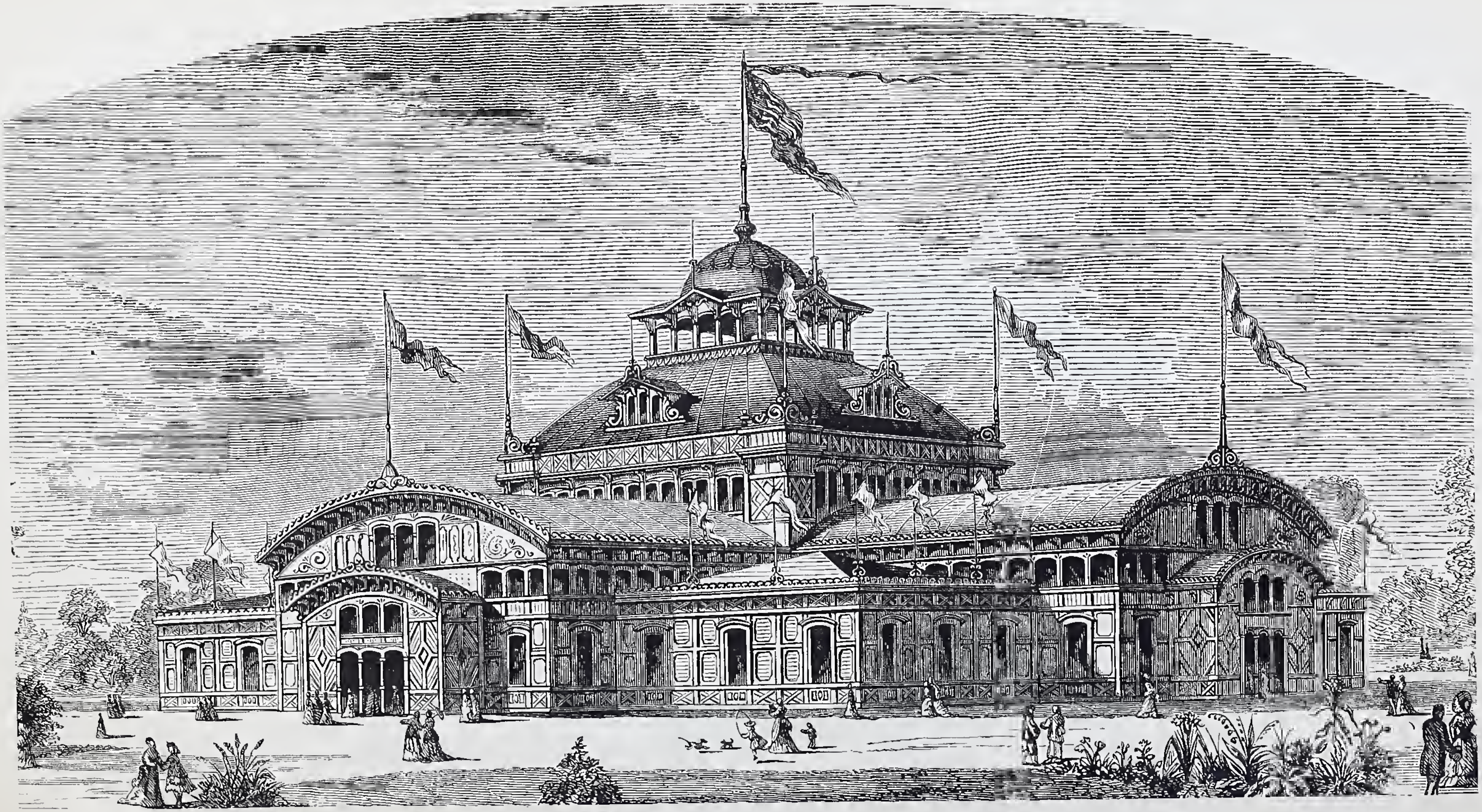
SHOE AND LEATHER EXHIBIT.

Exhibits.

The Exhibits in the Shoe and Leather Building were classified mainly under the following heads: 1. Oils and Leather Dressing. 2. Boots and Shoes. 3. Trunks, Valises, etc. 4. Saddlery and Hardware. 5. Fabrics of Vegetable, Animal, or Mineral Materials. 6. Carriages, Vehicles, and Accessories. 7. Leather Machinery. 8. Shoe Machinery. 9. Animal and Vegetable Products. 10. Harness, Kip and Calf. 11. Morocco and Sheep.

Exhibitors.

The United States was largely represented through individual Exhibitors; and Great Britain, Germany, and Russia also made creditable displays. According to the Official Catalogue, the total number of Exhibitors was 542. (See table "Exhibits by States," p. 178.)



Women's Pavilion.

THE WOMEN'S EXHIBIT.

Classification.

Special features.

Schools of Design represented.

The Queen's contributions.

The Exhibits in the Women's Pavilion were classified mainly under the following heads: 1. Ceramics—Pottery, Porcelain, Glass, etc. 2. Yarns and Woven Goods of Vegetable or Mineral Materials. 3. Woven and Felted Goods of Wool, etc. 4. Clothing, Jewelry, Ornaments, Embroideries, Laces, Traveling Equipments, etc. 5. Paper, Blank Books, and Stationery. 6. Medicine, Surgery, Prothesis. 7. Hardware, Edge Tools, Cutlery, and Metallic Products. 8. Carriages, Vehicles, and Accessories. 9. Educational Systems, Methods, and Libraries. 10. Institutions and Organizations. 11. Scientific and Philosophical Instruments and Methods. 12. Sculpture. 13. Painting. 14. Engraving and Lithography. 15. Industrial and Architectural Designs, etc. 16. Ceramic Decorations, Mosaics, etc. 17. Machines used for Weaving, Sewing, etc. 18. Aerial, Pneumatic, and Water Transportation. 19. Land Animals. 20. Hot-house, Conservatories, Graperies. 21. Garden Tools, Accessories of Gardening. Special features of the Women's Exhibit consisted of a collection of carved work, paintings, etc, from ladies of the Cincinnati School of Design, Cincinnati, Ohio; a collection from the School of Design at Pittsburg, Pennsylvania, embracing oil and water-color paintings, crayon drawings, etc.; and the following articles contributed by Her Majesty Queen Victoria: Two table napkins, spun by Her Majesty. Etchings by Her Majesty the Queen. A table cloth, embroidered and made by H. R. H. Princess Louis of Hesse, and H. R. H. Princess Christiana of Schleswig Holstein. A banner screen, embroidered by H. R. H. the Princess Beatrice. Drawings of flowers, by H. R. H. the Princess Louise.

United States.

Foreign countries represented.

In addition to large representations of interesting objects from various parts of the United States, the following foreign countries exhibited rare specimens of their resources and handiwork: Great Britain, Jamaica, Canada, Tasmania, France, Belgium, Netherlands, Denmark, Sweden, Italy, Tunis, and Brazil.

UNITED STATES GOVERNMENT EXHIBIT.

United States Government Buildings.

Governmental Departments represented.

The United States Government Exhibit was made in several special buildings styled, respectively, the United States Government Building, the Ordnance Laboratory Building, the United States Army Post Hospital, and the Transit of Venus Buildings. These buildings have been fully described elsewhere.* Contributions were made by the following Departments: *War Department*—Hon. J. DONALD CAMERON, Secretary of War; *Navy Department*—Hon. GEO. M. ROBESON, Secretary of the Navy; *Treasury Department*—Hon. LOT M. MORRILL, Secretary of the Treasury; *Interior Department*—Hon. Z. CHANDLER, Secretary of the Interior;

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* See page 126.

Post-Office Department—Hon. James M. Tyner, Postmaster-General; *Agricultural Department*—Hon. Frederick Watts, Commissioner of Agriculture; *Smithsonian Institution*—Prof. Joseph Henry, Director of Smithsonian Institution; *Commission of American Food Fishes*—Prof. S. F. Baird, Commissioner.

Executive Board.

The Board on behalf of the United States Executive Departments was constituted as follows: Col. S. C. Lyford, Ordnance Corps, U. S. Army, Chairman of the Board, and Representative of the War Department at the Exhibition; Rear Admiral Thornton A. Jenkins, U. S. Navy, Representative of Navy Department; Hon. R. W. Tayler, First Comptroller Treasury, Representative of Treasury Department; Hon. John Eaton, Commissioner of Education, Representative of Interior Department; Dr. C. F. Macdonald, Superintendent Money Order Bureau, Representative of Post-Office Department; William Saunders, Superintendent Propagating Garden, Representative of Agricultural Department; Prof. S. F. Baird, Assistant Secretary Smithsonian Institution, Representative of Smithsonian Institution, and Commissioner of American Food Fishes; Wm. A. De Caindry, Secretary of the Board.

War Department.

The contributions of the War Department were arranged in sections.

Signal Section.

The Signal Section comprised meteorological instruments used in the signal service, all of which were of American manufacture, and were only such as had been devised by officers or enlisted men of the corps; a model United States signal service station, with the instruments used and the system pursued in making weather reports; the printing of "weather maps" and "farmers' bulletins;" field-telegraphs, signal towers, and apparatus used in communicating with troops in the field or with vessels; and models of signal, meteorological and electrical instruments.

Quartermaster Section.

The Quartermaster Section included specimens of every kind of uniform the army had ever used; camp and garrison equipage, tents, cooking utensils, etc.; means of transportation, wagons, etc.; machines for cutting out clothing, etc.; artificers' tools; and standard horse shoes, veterinary chest, and Kiernan's system of horse-shoeing.

Medical Section.

The Medical Section embraced post and field hospitals and models of the general hospitals used in the war of 1861–5; medical and hospital supplies; stretchers, litters, and other means of transportation of sick and wounded; and an army medical museum.

Engineer Section.

The Engineer Section comprised maps and drawings of the principal works undertaken by corps of engineers from 1776 to 1876, such as bridges, canals and locks, river improvements, piers, forts, breakwaters, harbor improvements, light-houses, etc.; models of harbor improvements, models of machinery and appliances; photographs of engineering achievements; materials, specimens, and samples collected during the progress of peculiar undertakings; and a variety of miscellaneous articles, such as pontoon wagons, bridge train, torpedoes, surveying, astronomical, and barometrical instruments, etc.

Ordnance Section.

The Ordnance Section included sea coast guns of various patterns; a siege gun; a great variety of field guns; volley and repeating guns of several designs; a number of

Revolutionary guns; mortars; carriages; all kinds of projectiles; a historical collection of small arms; accoutrements, embracing sets of infantry, cavalry, and artillery equipments, etc.; models of soldiers of different branches of the service, fully equipped, models of horses equipped for service, and specimens of gun material, etc.; machines used in the manufacture of cartridges and guns; instruments used in calculating pressure, velocity, recoil, etc.; and boards showing rifle practice, etc.

Navy Department.
Ordnance Branch.
Navigation Branch.
Yards and Docks Branch.
Steam Engineering Branch.
Equipment and recruiting Branch.
Construction and repair Branch.
Medical and Surgical Branch.
Pay, Provision, and Clothing Branch.

The Exhibits of the Navy Department were collected in branches. The Ordnance Branch included rifled and smooth bore guns, torpedoes, small arms, etc.; machines for making percussion caps; projectiles of all kinds; and figures of sailors, historically arranged. The Navigation Branch embraced navy bunting and navy flags, testing machines, sounding machines, signal apparatus, compasses, and an adjustable binnacle; a naval observatory, with publications, photographs, chronometers, Arctic explorations illustrated, and the buildings and instruments used in the observations of the transit of Venus, December 8 and 9, 1874; nautical charts and books, etc., published by the Hydrographic Office; and publications of the Nautical Almanac Office. The Yards and Docks Branch comprised plans of the different navy yards; plans of navy yard machinery and dry docks; photographs of buildings, etc. The Steam Engineering Branch included the machinery of the *Nipsic* and of steam launches; the engines of the *Epervier;* the first torpedo machinery used in the navy; drawings of compound engines; photographs of machine shops, etc.; and methods of making fresh water on board ship at sea The Equipment and Recruiting Branch embraced Young's ship's galley, with utensils for cooking for 500 men; hemp, manilla, and wire rope; and cable, blocks, etc. The Construction and Repair Branch comprised models of many vessels. The Medical and Surgical Branch included medicines and hospital stores used in the navy. The Pay, Provision, and Clothing Branch embraced articles and materials of clothing; "small stores," utensils, etc.; account books, etc.

Treasury Department.

In regard to the Exhibit of the Treasury Department, the Official Catalogue contained the following statement: "Owing to want of sufficient appropriation by Congress for defraying the expense of the participation in the Exhibition by the Treasury Department, no definite arrangements have yet been made for contributions from it.—March 31, 1876."

Interior Department.
Patent Office.
Pension Office.
General Land Office.
Indian Office.
Education Office.

The following contributions were made by the Interior Department: Patent Office—publications, drawings of models, 5,000 models, and an interesting historical collection. Pension Office—publications. General Land Office—publications, maps, charts, atlas of surveys, etc. Indian Office—publications, illustrations, such as portraits and photographs, models of wigwams, canoes, etc., and costumes, utensils, and miscellaneous articles. Education Office—publications by the office, foreign reports, educational journals, maps and charts, engravings, paintings, etc., models of educational buildings, specimens of school furniture, apparatus and books, a miscellaneous collection of reports of educational institutions, etc. Census Office—publications, maps, charts, etc. Geological and Geographical Survey of the Territories—publications, maps, charts, photographs, paintings, etc., models and relief maps, and collections of interest.

Census Office.

Territorial Surveys.

The Post-Office Department exhibited a model working post-office. This was a branch office or station of the Philadelphia office, and showed the practical workings of the following divisions of this Department, viz.: Box and general delivery system; system of carrier delivery and collections; registered letter system; money-order system; foreign mail system, etc. The railway mail service was practically explained by two postal cars fully equipped, and also by model mail cars with mail bag catcher working on a miniature track. Envelope machines were in operation manufacturing stamped envelopes. Specimens of all the stamps were exhibited. Postal cards were made by machinery on exhibition. A full set of pouches, complete postal-route maps, and specimens of all books, blanks, etc., used by the Department, completed the exhibit under this head.

Post-Office Department.

Model Working Post-Office.

Railway Mail Service.

Envelope Machines.

Stamps, Postal Cards, etc.

The Agricultural Department classified its exhibition in several divisions. The Botanical Division embraced a collection of trees, flowers, grasses, etc. The Statistical Division included maps showing forest areas, farming lands, etc., and miscellaneous statistics. The Entomological Division comprised collections of fruit and vegetable models, birds, poultry types, etc., and a mounted collection of insects. The Microscopical Division embraced water-color drawings illustrating fungi, mushrooms, etc. The Chemical Division included fertilizers of all kinds, methods of preserving, etc., products obtained by fermentation, and other chemical matters. The Horticultural Division embraced specimens of plants, showing methods of growth, culture, etc.

Agricultural Department.

Botanical.

Statistical.

Entomological.

Microscopical.

Chemical.

Horticultural.

The Smithsonian Institution exhibited the publications of the Institution; a collection to illustrate the animal resources of the United States, in charge of Mr. G. BROWNE GOODE; a collection to illustrate the fishery resources of the United States, made in connection with the Commission on American Food Fishes; a collection to illustrate the ethnology of the United States, made conjointly with the Indian Bureau of the Interior Department, and placed in charge of Dr. CHARLES RAW; and a collection to illustrate the mineral resources of the United States. The last named collection of minerals was in charge of Prof. W. P. BLAKE. The principal objects of this collection of the useful ores and minerals of the country were to illustrate: 1st. The nature and variety of the mineral resources of the United States; 2d. The geographical distribution and geological associations of the minerals; 3d. The extent to which they have been utilized; 4th. The mechanical, metallurgical, and chemical processes by which they are extracted or converted into useful products; 5th. The inherent and comparative qualities of the extractive products.

Smithsonian Institution.

Animal resources.

Fishery resources.

Ethnology.

Mineral resources.

AWARDS.

System prepared by the Executive Committee.

The important duty of preparing a system of Awards for the Centennial Exposition was entrusted to the Executive Committee. The subject received prolonged and careful consideration, during which was solicited the counsel of a large number of persons whose connection with previous International Exhibitions, as Exhibitors, Commissioners, or Jurors, had given them special familiarity with the matter. It was decided, after much deliberation, to retain the use of awards, but upon a system greatly different rom that employed at any previous Exhibition. By the adoption of a single uniform medal, to be accompanied in each case by a report and diploma stating the nature of the merit for which it was awarded, it was ought to avoid disputes such as had previously arisen between successful competitors as to the comparative importance of several grades of awards. The difficulties which had been experienced from the unwieldy size of the international juries, and which were anticipated in procuring experts of acknowledged proficiency from abroad, were met by deciding upon a small body of Judges, one-half of whom should be from the United States and one-half foreign; while, to ensure the presence and attention to their duties of men practically conversant with the subjects they were to report upon, an allowance designed to cover their traveling expenses and cost of remaining in Philadelphia, was made to the Judges. As the result of these measures, it was expected that the awards would be made with more system and thoroughness than on any previous occasion, and that the character of the Judges would give recognized value to their reports.

Variance from former systems.

Uniform medal, with diploma and judges' report.

Difficulties intended to be overcome.

Judges, how selected.

This innovation upon former usages, however, met with opposition on the part of a number of the foreign Judges, who formally protested against it. Due consideration was given by the Executive Committee to this protest, but no sufficient reason appeared for making any change. After a conference with the Judges, and a full discussion of the subject, in which some of the ablest of the foreign Commissioners sustained the rules which had been adopted, there was a general approval of what may hereafter be known as the American System of Awards.*

Protest against the system.

The American system adopted.

[*Extract from Circular of April 8, 1876.*]

Circular of April 8, 1876, relative to awards.

Awards shall be based upon written reports attested by the signatures of their authors.

The Judges will be selected for their known qualifications and character, and will be experts in departments to which they will be respectively assigned. The foreign members of this body will be appointed by the Commission of each country and in conformity with the distribution and allotment to each, which will be hereafter announced. The Judges from the United States will be appointed by the Centennial Commission.

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* The subject of Awards was placed in charge of a special Bureau, of which Professor Charles J. Stille, Provost of the University of Pennsylvania, was constituted Chief. That gentleman resigned the position, however, and Hon. Francis J. Walker, of Yale College, was appointed to fill the vacancy. General Walker performed his onerous and delicate duties with signal ability and impartiality, thereby winning the good opinion of Judges and Exhibitors, both native and foreign.

* * * * * * * * * *

Reports and awards shall be based upon inherent and comparative merit. The elements of merit shall be held to include considerations relating to originality, invention, discovery, utility, quality, skill, workmanship, fitness for the purposes intended, adaptation to public wants, economy and cost.

Each report will be delivered to the Centennial Commission as soon as completed, for final award and publication.

Awards will be finally decreed by the United States Centennial Commission, in compliance with the Act of Congress, and will consist of a diploma with a uniform Bronze Medal, and a special report of the Judges on the subject of the Award.

Each exhibitor will have the right to produce and publish the report awarded to him, but the United States Centennial Commission reserves the right to publish and dispose of all reports in the manner it thinks best for public information, and also to embody and distribute the reports as records of the Exhibition.

[*Extract from Circular of May 1, 1876.*]

Circular of May 1, 1876 relative to awards.

Two hundred and fifty Judges have been appointed to make such reports, one-half of whom are foreigners and one-half citizens of the United States. They have been selected for their known qualifications and character, and are presumed to be experts in the Groups to which they have been respectively assigned. The foreign members of this body have been appointed by the Commission of each country, in conformity with the distribution and allotment to each adopted by the United States Centennial Commission. The Judges from the United States have been appointed by the Centennial Commission.

To facilitate the examination by the Judges of the articles exhibited, they have been classified in Groups. To each of these Groups a competent number of Judges (Foreign and American) has been assigned by the United States Centennial Commission. Besides these, certain objects in the Departments of Agriculture and Horticulture, which will form temporary exhibitions, have been arranged in special Groups, and Judges will be assigned to them hereafter.

The Judges will meet for organization on May 24, at 12 M., at the Judges' Pavilion. They will enter upon the work of examination with as little delay as practicable, aud will recommend awards without regard to the nationality of the exhibitor.

The Judges assigned to each Group will choose from among themselves a Chairman and a Secretary. They must keep regular minutes of their proceedings. Reports recommending awards shall be made and signed by a Judge in each Group, stating the grounds of the proposed award, and such reports shall be accepted, and the acceptance signed, by a majority of the Judges in such Group.

The reports of the Judges recommending awards based on the standards of merit referred to in the foregoing System of Awards, must be returned to the Chief of the Bureau of Awards not later than July 31, to be transmitted by him to the Centennial Commission.

Awards will be finally decreed by the United States Centennial Commission, in compliance with the Act of Congress of June 1, 1872, and will consist of a special report of the Judges on the subject of the Award, together with a Diploma and a uniform Bronze Medal.

Upon matters not submitted for competitive trial, and upon such others as may be named by the Commission, the Judges will prepare reports showing the progress made during the past hundred years.

Vacancies in the corps of Judges will be filled by the authority which made the original appointment.

No exhibitor can be a Judge in the Group in which he exhibits.

An exhibitor, who is not the manufacturer or producer of the article exhibited, shall not be entitled to an award.

The Chief of the Bureau of Awards will be the representative of the United States Centennial Commission in its relations to the Judges. Upon request, he will decide all questions which may arise during their proceedings in regard to the interpretation and application of the rules adopted by the Commission relating to awards, subject to an appeal to the Commission.

[*Extract from Director General's Address to Judges, May 24, 1876.*]

Address to Judges, May 24, 1876.

"The method of initiating awards which we have adopted differs in some respects from that pursued in previous exhibitions. In place of the anonymous verdict of a jury, we have substituted the written opinion of a Judge. On this basis awards will carry the weight and guarantees due to individual personal character, ability, and attainments and to this extent their reliability and value will be increased. It is not expected that you will shower awards indiscriminately upon the products in this vast collection. You may possibly find a large proportion in no way raised above the dead level, nor deserving of particular notice. The standard above which particular merit worthy of distinction begins, is for you to determine. In this regard I have only to express the desire of the Centennial Commission, that you should do this with absolute freedom, and when you meet with a product which you consider worthy of an award, we desire you to say, in as few words as you may deem suitable, why you think so.

"This, gentlemen, is all we ask of you in the Department of Awards. Opinions thus expressed will indicate the inherent and comparative merits, qualities, and adaptations of the products,—information which the public most desires.

"Elaborate general reports and voluminous essays, though of great value as sources of general information, give little aid in determining the reliable or intrinsic merits of particular, individual products.

"The regulations which have been published divide the work of awards into three parts:

"1st. The individual work of the Judges.

"2d. The collective work of the groups of Judges.

"3d. The final decisions of the United States Centennial Commission in conformity with the acts of Congress.

"Each award will thus pass three ordeals, which, doubtless, will be ample and satisfactory."

POST 58, G. A. R.

Judges and Groups.

A list of the Judges, with the various Groups to which they were assigned, will be found in Vol. II, Appendix D, pp. 54–57. The installation of the Judges took place on the 24th of May, in the Judges' Pavilion, and was conducted in a very impressive manner by the Centennial Commission.

Judges' reports.

Complaints of certain exhibitors.

Committee on Appeals.

The consideration and disposal of the recommendations of the Judges for Awards, was begun by the Commission on the 7th September, 1876. As the work progressed, complaints were made by various Exhibitors, that, by reason of irregularities, neglect of duty, or some other cause assigned, injustice had been done them by the Judges. To remedy these complaints, and to secure, if possible, equal and exact justice to all, the Commission, on the 18th September, appointed a special committee of five, consisting of Messrs. C. P. KIMBALL, *Chairman*, New York; D. J. MORRELL, Pennsylvania; J. MCNEIL, Missouri; A. J. DUFUR, Oregon; and GEORGE H. CORLISS, Rhode Island;* to whom were referred all contests, appeals, and communications from Exhibitors claiming that injustice had been done them in any matter relative to the examination of their products or in the reports of the Judges. This Committee promptly organized, and began its labors. In addition to the many cases of contests referred to it by the Commission, the number of appeals far exceeded any estimate which had been made, and represented every part of the Exhibition, and nearly every country To facilitate its work, therefore, the Committee recommended, and the Centennial Commission appointed, the following named gentlemen as the group of Judges on Appeals, viz.: JOHN FRITZ, Bethlehem, Pa.; HECTOR TYNDALE, Philadelphia, Pa.; CHARLES STAPLES, Portland, Me.; Prof. S F. BAIRD, Washington, D. C.; B. F. BRITTON, New York, Prof. H. H. SMITH, Pennsylvania University; M. WILKENS, Oregon; FRANK THOMSON, Philadelphia, Pa.; HENRY K. OLIVER, Salem, Mass.; COLEMAN SELLERS, Philadelphia, Pa.; JAMES L. CLAGHORN, Philadelphia, Pa.; and EDWARD CONLEY, Cincinnati, Ohio. These gentlemen were selected from the former Judges, and on account of their ability and diversified knowledge. They organized promptly, carefully examined and reported upon the many cases referred to them, and in every way discharged their duties to the satisfaction of the Committee on Appeals and of the Centennial Commission. Under the regulations no appeals or contests were received or heard after the 14th November, at 12 M.

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* Mr. John Wasson, of Arizona, was subsequently added to the Committee.

Organization of the Committee.

Judges on Appeals.

Appeals closed November 14th.

Other organizations were also constituted by the Commission in reference to the subject of awards. On the 18th September, 1876, Messrs. JOHN LYNCH, Louisiana, THOMAS DONALDSON, Idaho, and WILSON W. GRIFFITHS,* Ohio, were appointed a special committee to carefully examine all reports for awards; to make all such changes and corrections as the rules adopted for that purpose should warrant; to take the supervision and charge of the preparation of diplomas and final reports; and to report from time to time to the Commission. In pursuance of a resolution passed the same day, Messrs. T. E. SICKELS, J. A. JOHNSON, C. JUHLIN DANNFELT, E. ALLENDORFF, and T W. TALMADGE were subsequently appointed a special group of Judges on National, State, and Collective Exhibits.

Committee to examine reports for awards.

Judges on national, State and collective exhibits

In accordance with a programme which had previously been arranged, a general distribution of awards was made at the Judges' Hall, on the evening of Wednesday, September 27, 1876. The assemblage was large and distinguished, embracing the Governor and State officers of Pennsylvania, with the Governors of other States and Territories; the Mayor and other officers of the municipality of Philadelphia; the Chiefs of the various Bureaus of the Exhibition, with their assistants; members of the Boards of Centennial Managers, representing the several States and Territories; and a number of other gentlemen, eminent in public or in private life, with an imposing representation of ladies.

Distribution of awards at Judges' Hall.

Character of the assemblage.

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* On the 14th October, 1876, in the absence of Mr. Griffiths, Mr. A. R. Boteler, of West Virginia, was added to this Committee.

Officials and special guests.

The presiding officer of the occasion, Hon. **Daniel J. Morrell**, was escorted to the chair at precisely 8 o'clock. Then followed the introduction of the guests and officials of the ceremony: the members of the United States Centennial Commission and of the Board of Finance; the United States Government Exhibition Board, headed by its chairman, Col S. C. **Lyford**, U. S. A.; the International Board of Judges, led by Gen. **Francis A. Walker**, Chief of the Bureau of Awards; the Foreign Commissioners, escorted by Director General **Goshorn**; and representatives of the National Government and Diplomatic Corps, accompanied by Hon. **Joseph R. Hawley**, President of the Centennial Commission, and Mr. **John Welsh**, President of the Centennial Board of Finance.

Prayer.

After prayer by the Rev. **Henry A. Boardman** D D., Mr. Chairman **Morrell** addressed the assemblage as follows:

Mr. Morrell's address.

Ladies and Gentlemen:—The acts of Congress which provide for celebrating the one hundredth anniversary of American Independence, by holding an International Exhibition in the city of Philadelphia, in the year 1876, have made it the duty of the United States Centennial Commission, created by these acts, to award all premiums to exhibitors.

The judges appointed by foreign governments and by this Commission have closed their labors; their reports have been examined by the Chief of the Bureau of Awards and by the Commission, and, in so far as they have been found to be in conformity with the rules, and in proper form, they are approved, and you are invited to witness their publication as awards, which will hereafter be completed by the delivery of diplomas and medals.

In accordance with the rules of the Commission, these reports are based upon the inherent and comparative merit of the things exhibited, involving considerations of originality, invention, discovery, utility, quality, skill, workmanship, fitness fo the purpose intended, adaptation to public wants, economy and cost; and they are attested by the signatures of their authors.

Those who have won prizes in this contest, open to the world, are congratulated upon receiving, in these reports, a fitting testimonial of excellence; yet those who have striven unsuccessfully will not be without their reward. While some individual exhibitors may have felt and manifested disappointment and jealousy, the competing countries have shown the most friendly and generous rivalry; in the school of the Exhibition their representatives have been quick to recognize their own defects and the merits of others, and have learned its best lesson, which may be tersely embodied in the maxim of the Grecian sage: "Know thyself."

The awards here made recognize the achievements of labor in overcoming the resistance which nature everywhere opposes to the infinite wants of man, and will encourage it to further efforts in extending the kingdom of use They testify to a universal acknowledgment of industry as the strength of nations, and will inspire in all countries a higher regard for the laborer, and a greater pride in the perfection of his work.

It is the prayer of this Commission that the International Industrial Exhibition, which celebrates the hundredth anniversary of American Nationality, may mark the beginning of a new era of peace on earth, in which the nations, while communicating knowledge freely, will intelligently foster the labor of their people, and diligently strive to excel each other in all good work.

By the authority of the Government of the United States of America, as expressed in the laws of the National Congress, the President of this Commission will deliver the awards to the Commissioners of foreign nations represented in the Exhibition, and to the Director General for distribution to the exhibitors of the United States.

Call of foreign nations.

Appropriate addresses were also made by Director General Goshorn and General Hawley. At the close of his remarks, the latter gentleman, as President of the Centennial Commission, called in alphabetical order the names of the nations represented at the Exhibition, the United States being reserved until the last. As each nation was called, the Commissioner designated to receive the awards* was introduced to the President by the Director General, the list being as follows:

Foreign nations and their representatives.

Argentine Republic	Mr. Ernesto Oldendorff.
Austria	Dr. Francis Migerka.
Africa—Orange Free State	Mr. Charles W. Riley.
Belgium	Mr. J. Gody
Brazil	Mr. Fellippe Lopez Netto.
Chili	Mr. Edward Shippen.
China	Mr. J. L. Hammond.
Denmark	Mr. Thomas Schmid
Egypt	Mr. E. Brugsch.
France	Captain Anfrye.
German Empire	Mr. Gustavus Remak.
Grand Duchy of Luxembourg	Mr. F. Berger.
Hawaiian Islands	Mr. H. R. Hitchcock.
Italy	Count B. Litta.
Japanese Empire	Lieut.-Gen. Saigo Tsukumichi.
Mexico	Mr. Manuel M. de Zamacona.
Netherlands	Dr. E. H. von Baumhauer.
Norway	Mr. William C. Christophersen.
Portugal	H. E. the Baron de Sant' Anna.
Russia	H. E. Mr. Charles de Bieisky.
Spain	Colonel F. Lopez Fabra.
Sweden	Mr. C. Juhlin Dannfelt.
Switzerland	Mr. Edward Guyer.
Tunis	Mr. G. H. Heap.
Turkey	H. E., G. D'Aristarchi Bey.
United Kingdom and Colonies	Colonel Herbert B. Sandford, R. A.
Bahamas, New Zealand, Tasmania	Dr. Edward T. Webb.
Bermuda	Mr. A. A. Outerbridge.
British Guiana	Mr. A. A. Outerbridge.
Cape of Good Hope	Mr. H. Crawford Coates.
Canada	Hon. E. G. Penny.
Ceylon, India, Gold Coast, Mauritius, Trinidad	Colonel H. B. Sandford, R. A.
Jamaica	Mr. William Robert Thomson.
New South Wales	Mr. Augustus Morris.
Queensland	Mr. Angus Mackay.
South Australia	Mr. S. Davenport.
Victoria	Sir Redmond Barry.
Venezuela	Mr. Leon de la Cova.

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*It was announced at this distribution that the Commission had formally approved eleven thousand reports, and had awarded thereon the uniform medal and diploma. Of course, at that time, many reports were still under consideration. The grand total of awards, including these made in the live-stock department and other special exhibitions, is understood to have been about sixteen thousand.

As the representatives of the different foreign countries were presented to the President, they were most cordially greeted, the audience repeatedly manifesting its applause by rising and cheering. Cordial greetings.

The President concluded the distribution of awards by handing to the Director General the list of those for Exhibitors from the United States. Awards to U. S. exhibitors.

The exercises were agreeably interspersed with instrumental music by Mr. Carl Heineman's orchestra, and vocal music by the Temple Quartette. A grand promenade, performed by the First Brigade Band, brought the interesting and impressive ceremonies to a close. Close of the ceremonies.

THE RESTAURANTS.

Concessions to open restaurants on the Exhibition grounds were granted to a great many parties, and the question of providing food was settled very satisfactorily both in regard to the quality of the refreshments supplied and the prices charged for them. Concessions to venders of food. The Centennial Commission retained a stipulated control over all caterers and vendors of food, exorbitant charges rendering offenders liable to a forfeiture of their concessions. Exorbitant rates a cause of forfeiture. Reasonable rates were thus guaranteed from the beginning, but in some cases complaints were made to the Commission that excessive prices were charged, which, being investigated, resulted in the discovery that some of the servants had been endeavoring to take advantage of certain customers by falsely reckoning their bills. Complaints. Soon after the opening of the Exposition a number of servants were discharged; their places were supplied with honest persons, and few complaints were heard afterwards. Dismissal of dishonest servants.

Many of the restaurants were conducted on an extensive scale, having accommodations for large numbers of guests, and being well supplied with servants. Accommodations. Attendance was generally prompt, the bill of fare was comprehensive, and the prices were about the same as those usually charged in city restaurants. Attendance. Rates.

The places of refreshment occupying buildings of their own were as follows: *American Restaurant*, by Tobiason & Heilbrun, Philadelphia; *Dairy Association; Department of Public Comfort* by Department of Public Comfort Company, Limited, W. Marsh Kasson, Chairman, Philadelphia; *George's Hill Restaurant*, by Talman & Kohn, Philadelphia; *German Restaurant*, by Philip Lauber, Philadelphia; *Restaurant Lafayette; "South" Restaurant*, by E. Mercer, Atlanta, Ga.; *New England Farmer's Home and Modern Kitchen*, by Miss. E. B. Southwick, Boston; *"Trois Freres Provencaux" Restaurant*, by Louis Goyard; *Vienna Bakery*, by Gaff, Fleischmann & Co., Blissville, Long Island, N. Y. Principal places of refreshment. There were also pop-corn buildings, soda water stands, lager beer pavilions, cigar stands, and the *Turkish Cafe* and the *Tunisian Cafe*, all having special buildings on the grounds, and ministering to the appetites and desires of the thousands of daily visitors. Pop-corn buildings, soda water stands, etc.

Descriptions of these buildings are given under the head of "Places of Refreshment."*

Eating-stands, restaurants, etc., in the principal buildings.

A convenience to visitors.

In each of the five principal buildings there were eating stands and restaurants, which were usually located near the main entrances. All these places of entertainment were excellently conducted, and were singularly free from objectionable features. Stands for the sale of soda water, pop-corn, etc., were scattered through these buildings in profusion. This arrangement proved to be a great convenience to those who desired to spend a day in examining the Exhibits in some special locality, the restaurants being so located that no part of the grounds or buildings was unsupplied.

Places of refreshment outside the enclosure.

The visitors to the Exhibition who paid an admission fee were satisfied with the entertainment provided for them within the enclosure; hence comparatively few of them acquired a personal knowledge of the excellent restaurants which were located outside of the grounds in the immediate vicinity of the Exhibition. Those who were favored with passes were enabled to dine outside of the gates without incurring additional expense. Exhibitors, attendants, members of the press, etc., frequently availed themselves of their opportunity to visit the outside restaurants when they desired to avoid the mid-day crowds at the eating-houses within the enclosure, and much patronage was thus bestowed on them. They were very numerous, and were generally very well conducted.

MUSICAL ATTRACTIONS.

Music.

A most pleasing feature of the Centennial Exposition consisted in the variety and excellence of the music which was there furnished.

Pianos.

Specially prepared for exhibition.

Location of group of musical instruments.

Advantages of location.

Simultaneous performances.

American pianos having received the highest awards at previous International Exhibitions, it was early understood that a number of instruments of extraordinary merit were being specially prepared for the Centennial. Great care was taken, therefore, to provide such facilities for their display as would be alike satisfactory to the manufacturers performers, and the listening public. The group of musical instruments in the Main Building was placed in the most central part of the American section, a location admirably adapted to display the volume, tone, and general qualities of the different instruments. Notwithstanding the fact that a majority of these Exhibits were located in close proximity, yet, during the first few months, no particular inconvenience resulted from simultaneous performances. After September 1st, however, the large number of visitors increased the inducements for these performances to such an extent, that, for the mutual benefit of all concerned, the following schedule was adopted, regulating the hours for piano recitals at Exhibition spaces:

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* See pp 145–49.

PIANO RECITALS.

Schedule regulating piano recitals.

	Monday.	Tuesday.	Wedn'day	Thursday.	Friday.	Saturday.
Schomacker Pianoforte Manufacturing Co	10.30 to 11	10.30 to 11	10.30 to 11	10.30 to 11	10.30 to 11	10.30 to 11
Mason & Hamlin Organ Co	11 “ 11.30	11 “ 11.30	11 “ 11.30	11 “ 11.30	11 “ 11.30	11 “ 11.30
George Steck & Co	11 “ 11.30	11 “ 11.30	11 “ 11.30	11 “ 11.30	11 “ 11.30	11 “ 11.30
Hazleton Bros	11.30 “ 12	11.30 “ 12	11.30 “ 12	11.30 “ 12	11.30 “ 12	11.30 “ 12
C. M. Stieff	12 “ 12.30	12 “ 12.30	12 “ 12.30	12 “ 12.30	12 “ 12.30	12 “ 12.30
Wm. Knabe & Co	12.30 “ 1	12.30 “ 1	12.30 “ 1	12.30 “ 1	12.30 “ 1	12.30 “ 1
Albert Weber	1 “ 1.30	1 “ 1.30	1 “ 1.30	1 “ 1.30	1 “ 1.30	1 “ 1.30
Kranich & Bach	2 “ 2.30	2 “ 2.30	2 “ 2.30	2 “ 2.30	2 “ 2.30	2 “ 2.30
Steinway & Sons	....	2.30 “ 3	....	....	2.30 “ 3	....
Henry F. Miller	2.30 to 3	....	2.30 to 3	2.30 to 3	....	2.30 to 3
Hugh Hardman	3 “ 3.30	3 to 3.30	3 “ 3.30	3 “ 3.30	3 to 3.30	3 “ 3.30
Manhattan Pianoforte Co. United Piano Makers	3.30 “ 4	3.30 “ 4	3.30 “ 4	3.30 “ 4	3.30 “ 4	3.30 “ 4
Decker Bros	4 “ 4.30	4 “ 4.30	4 “ 4.30	4 “ 4.30	4 “ 4.30	4 “ 4.30

Number of piano recitals in Main Building.

The following statement shows the number of piano recitals given in the Main Building during the different months of the Exposition:

During	May	68	recitals.
“	June	184	“
“	July	235	“
“	August	244	“
“	September	342	“
“	October	351	“
“	November	117	“
	Total	1,541	recitals.

Piano recitals in Machinery Hall.

During the stoppage of the machinery, at noon, at a space in Machinery Hall near the Corliss engine, piano recitals were daily given by Professor BOSCOVITZ.

Music platform in Main Building.

Capacity.

Accommodations for the audience.

In the centre of the Main Building was a circular music platform, elevated two feet above the floor, surrounded by a balustrade, and furnished with a suspended sounding-board which could be adjusted to any desired height. The platform had a capacity sufficient to accommodate an orchestra of sixty-five pieces. The adjacent passage-way and portions of the nave and transept were freely provided with settees for the convenience and comfort of the audiences, which, for a period of four months, averaged two thousand daily. Concerts, orchestral and choral, were given at this stand as follows:

Number of concerts, orchestral and choral, at the grand stand.

Gilmore's Military Band, New York (in June)	44
United States Marine Band, Washington	2
Girard College Band, Philadelphia	2
First Connecticut Regiment Band	2
Colt's Band, Connecticut	2
First Brigade Band, Philadelphia	6
Carl Sentz's Military Band, Philadelphia	2
Young Maennerchor Society, Philadelphia	1
Handel and Haydn Society, Philadelphia	1

Young Apollo Club, New York	1
Ringgold Cornet Band, Reading, Pa	1
Jones's Cornet Band, Pottsville, Pa	1
Total	65

Number of piano, string quartette, and vocal concerts.

The piano, string quartette, and vocal concerts were as follows: May, 1; June, 12; July, 8; August, 6; September, 13; October, 34; November, 9; total, 83. Making in all one hundred and forty-eight concerts given at the central music platform.

The great organs.

The two great organs—the ROOSEVELT, in the north, and the HOOK & HASTINGS in the east gallery—were amongst the principal musical attractions in the Main Building. In size, they were immense, and each, in the wonderful completeness of its appearance and tone, proved remarkably impressive.

Number of recitals on the Roosevelt organ. Artists.

One hundred and fifty-nine stated recitals were given upon the ROOSEVELT organ, the following distinguished artists being among the numerous performers. Mr F. T. S. DARLEY, Philadelphia; Dr. AUSTIN PIERCE, New York; Mr. SAM'L WARREN, New York; Mr S. F. STRANG, New York; Mr. J. H. GILL, New York; Mr. CHAS. F. READ, New York; Mr. GEO. W. MORGAN, New York; Prof. HUGH A. CLARKE, Philadelphia; Mr. GEO. W. WARREN, New York; Mr. S. B. WHITNEY, Boston; Mr W. G. WITMORE, New York; Mr. JOHN GOODHALL, New York; Mr CHAS. H. CLARKE, Philadelphia.

Number of recitals on the Hook & Hastings organ. Artists.

Upon the HOOK & HASTINGS organ four hundred and seventy-three stated recitals were given. Among the performers were the following noted artists: Mr. J. C. KILBURN, (in charge); Mr. GEO. W. MORGAN, New York; Mr. DAVID WOOD, Philadelphia; Mr. S. B. WHITNEY, Boston; Mr. H. BIALLA, New York; Mr. H. CLARENCE EDDY, New York; Prof. HUGH A. CLARKE, Philadelphia; Mr. H. G. THUNDER, Philadelphia; Mr. GEO. E. WHITNEY, New York; Mr. S. F. STRANG, New York; Mrs. Q. A. PIERSON, Boston; Mr. ARTHUR J. CRESWOLD, Chicago.

Concerts at the Music Pavilion and other places on the grounds

Numerous concerts were given in the Music Pavilion in the Lansdowne Ravine, in the Main Plaza, and at other points in the enclosure, by the First Brigade Band of Philadelphia, and by similar organizations from this city and elsewhere. A number of the restaurants had bands or orchestras of their own.

The music a success.

Altogether the music arrangements proved a great success, as was daily shown by the applause bestowed by the large and delighted audiences upon the various performances.

The chimes.

Mention must be made in this connection of the chimes in the tower of Machinery Hall. These were under the direction of Professor WIDDOWES, of Washington, D. C., and were rung in the morning, at noon, and in the evening of each day. As chimes are not usually found outside the larger cities, the peculiar music produced and the mode of operation displayed by Professor WIDDOWES rendered his Exhibit highly interesting to many visitors.

THE MEDICAL DEPARTMENT.

Bureau of medical service.

The Medical Department was instituted early in 1876 to supply medical and surgical assistance within the Exhibition Grounds; to advise with reference to sanitary questions; and to issue in authoritative form such information on the sanitary condition of Philadelphia and of the Exhibition as might be desirable. The organization was as follows: *Medical Director*, William Pepper, M. D. *Officers of Medical Staff*, Jacob Roberts, M. D., S. W. Gross, M. D., H. C. Wood, Jr., M. D., Rowland G. Curtin, M. D., Hamilton Osgood, M. D., De Forest Willard, M. D. *Resident Physician and Secretary*, Theodore Herbert, M. D. The high personal and professional standing of the Medical Director and of the gentlemen comprising his staff gave ample assurance to the public of the ability and efficiency which would characterize the management of this very important branch of the Centennial service.

Organization.

Attendants.

There were also employed a nurse, two apothecaries, and four attendants and clerical assistants.

Centennial Hospital.

The Hospital had a retired, well shaded, and picturesque location in Lansdowne Ravine, on Lansdowne Avenue, between Agricultural and Belmont Avenues. It was a one-storied frame structure, 64 feet by 32 feet, well lighted and ventilated, and conveniently arranged, having a large waiting-room, No. 1, 19 feet 6 inches by 19 feet 6 inches; the office of the Medical Staff and of the Apothecary, No. 2, 19 feet 6 inches by 12 feet 6 inches; the office of the Director and Secretary, No. 3; the private room of the Resident Physician, No. 4; two wards, Nos. 5 and 6, for male and female patients, each 16 feet by 20 feet; two bath-rooms, and a private room for the nurse. It was furnished with every necessary convenience and comfort, and in every way answered the purposes for which it was intended. It was first occupied as a Hospital on the opening day of the Exhibition, May 10th, and from that time until November 15th, when the Exhibition was finally closed to the public.

Description.

Conveniences and comforts.

Date of opening.

Duties of the Bureau prior to May 10th.

The duties of the Department, prior to May 10th, were chiefly limited to the care of the employés engaged in the construction of the various buildings or in the preparation of the grounds, and of the attachés of the Foreign Commissions, who early began to take up their residences within the grounds. Though many thousands of workmen were engaged for eighteen months in the construction and preparation, the number of casualties was very small. Serious cases were transferred in ambulances to the hospital connected with the University of Pennsylvania.

Casualties among employes.

Active work of the Bureau.

The active work of the Department began with the opening of the Exhibition, but for the first few weeks, it seemed, the public were not fully aware that the comforts and advantages of a hospital were afforded within the enclosure. This was remedied, however, by giving ample notice of the fact, and by instructing the Guards to promptly convey to the hospital any person requiring medical relief.

Population residing on the grounds.

The average daily population resident within the grounds during the twenty-seven weeks of the Exhibition has been estimated at 1,568. The highest daily average was 1,817, during the week ending May 27th, and the lowest daily average was 1,382, during the week ending November 10th. The population was distributed as follows:

Resident population.

Residing at the several restaurants, daily average	256
Residing at the buildings of the several Foreign Commissions, daily average	103
Residing at the several State Buildings, daily average	88
In the employ of the United States Government, daily average	91
In the employ of the Board of Finance:	
Centennial Guard, daily average	802
Firemen, daily average	175
Janitors and others, daily average	53
Total	1,568

Effects of cold weather on foreigners.

The Japanese and their dwelling house.

Defective heating apparatus.

Sickness among the Japanese.

Among the numerous representatives of foreign countries quartered within the grounds, most of whom were sufficiently well housed and provided for, there were many who suffered severely from the keen cold of the early months of 1876, as well as from the intense heat of the summer. This was particularly the case with the Japanese Their dwelling, although a beautiful model of Oriental taste and workmanship, was barely suitable as a residence during the cool weather of an ordinary Philadelphia spring or fall. It had no provision for heating, excepting a small shallow box, filled with sand, placed in the centre of each room, upon which were kept burning a few small pieces of charcoal. As there was no outlet for the fumes thus generated, nor indeed any aperture whatever for ventilation when the rooms were closed, the inmates were subjected to a most unwholesome atmosphere. These depressing influences, combined with their meagre diet, caused considerable sickness among the Japanese. The chief forms of indisposition were diarrhœa and febrile affections of typhoid type. Out of about 50 individuals, including the members of the Japanese Commission and the Japanese Exhibitors, there were 9 cases of typhoid and typho-malarial fever. These cases were treated at the University Hospital, and all recovered.

Health of English residents.

Sanitary condition of English cottages.

Among the English residents, of whom there were 36, there was a moderate amount of diarrhœa, but only two cases of typhoid fever, both of which recovered. The excellent sanitary conditions of the English cottages were in marked contrast to the unhealthfulness of the Japanese colony.

Health of Centennial Guard.

Previous occupations of the Guard.

Sickness amongst the Guard.

Typhoid fever.

The health of the Centennial Guard was an important question in this connection. Although 1,176 men were enrolled, the daily average during the Exhibition was only 802. The enrolment showed that every age from 21 to 53 years, inclusive, was represented. The previous indoor-occupations of most of the men, notwithstanding they had been selected with great care as to their physical fitness, were not well calculated to fit them for the trying duties assigned to them and for bearing protracted exposure to intense summer-heat. The sickness which occurred amongst them was chiefly in the forms of diarrhœal and febrile affections and of solar exhaustion. From 25 to 30 cases of true typhoid or typho-malarial fever occurred among the Guard, whose average number for the months

Mortality among the Guard.

of May, June, July, and August, during which time all of the cases of fever originated, was 870. The total number of deaths known to have occurred in the Guard was 8, from the following causes:

Causes of mortality.

Typhoid and typho-malarial fevers, after removal to their homes in other States	3
Typhoid and typho-malarial fevers, after removal to hospital	3
Organic disease of the heart, with rupture, after removal to hospital	1
Variola, after removal to hospital	1
	8

Isolated cases of small-pox and measles.

The latter case was developed in one of the Guard who was quartered in a crowded barrack, and was the only case of small-pox that occurred. A single isolated case of severe measles presented itself in a different barrack.

Freedom from accidents.

Although there were 186,672 visitors on the opening day, there would seem to have been no serious accidents, since but 5 cases applied at the Medical Department, 3 of which were slight injuries and 2 were cases of exhaustion. From that date to the closing day (159 days in all) 6,463 cases were treated, making a daily average of about 41 The following analysis of the actual residences of the cases, is of interest:

Number of cases treated during the Exhibition.

I —RESIDENCES OF PATIENTS.

Residences of patients.

Austria	2	West Indies	1	Nebraska	7
Bavaria	1	Alabama	14	Nevada	2
Belgium	4	Arkansas	7	North Carolina	14
Bohemia	1	California	32	New Hampshire	66
Brazil	3	Colorado	8	New Jersey	249
Canada	68	Connecticut	292	New York	1,268
Cuba	1	District of Columbia	65	Ohio	318
England	55	Delaware	42	Oregon	1
France	23	Florida	9	Pennsylvania	2,104
Germany	21	Georgia	18	Rhode Island	58
Ireland	11	Illinois	116	South Carolina	11
Italy	4	Indiana	97	Tennessee	15
Japan	32	Iowa	64	Texas	11
Jerusalem	1	Kansas	21	Vermont	79
Norway	1	Kentucky	20	Virginia	58
Nova Scotia	11	Louisiana	6	Wisconsin	48
Poland	1	Massachusetts	495	Not known	165
Portugal	1	Maryland	139		
Prussia	4	Maine	42	Total	6,463
Russia	13	Michigan	163	United States	6,016
Syria	2	Minnesota	7	Foreign countries	282
Scotland	2	Mississippi	16	Not known	165
Sweden	12	Missouri	33		
Turkey	7	Montana	1	Total	6,463

It is seen from the above table that 93 per cent. of all persons treated were residents of the United States, representing 39 States and Territories; while but 4 36 per cent. of all were from foreign countries. Of those from the United States, 35 per cent. were from Pennsylvania, 21 per cent. from New York, 7.6 per cent. from Massachusetts, 4.9 per cent. from Ohio, 4.5 per cent. from Connecticut, and 3.8 per cent. from New Jersey.

Of those from foreign countries, 55 were from England, 32 from Japan, 23 from France, and 21 from Germany.

Sex of patients.

Of the total number of cases (6,463) 1,799 were females and 4,664 were males.

Ages of patients.

II.—AGES OF PATIENTS.

Ages.	Males.	Females.
Under 1 year	5	1
1 to 5 years	17	9
5 to 10 "	51	26
10 to 20 "	449	222
20 to 40 "	2,348	759
40 to 60 "	885	285
60 to 80 "	145	38
80 to 100 "	1	2
Not given	763	457
Total	4,664	1,799

The oldest patients included in the above table were one man aged 81, and two women aged respectively 95 and 96 years; while on the other hand, the youngest patients were 2 and 4 weeks respectively.

The following tables present a summary of the principal causes of sickness among the visitors to the Exhibition during the twenty-seven weeks of its continuance:

Analysis of medical and surgical cases treated at the hospital.

III.—MEDICAL CASES.

Respiratory and Circulatory Diseases.	
Asthma	9
Hay asthma	2
Bronchitis	135
Hæmoptysis	13
Organic disease of heart	8
Palpitation of heart	13
Miscellaneous	66
Total	246
Digestive Diseases.	
Cholera infantum	1
Cholera morbus	151
Diarrhœa	1,686
Dysentery	19
Indigestion	499
Cramps	487
Constipation	215
Miscellaneous	141
Total	3,199
Nervous Diseases.	
Apoplexy	2
Headache	356
Neuralgia (including toothache and earache)	364
Epilepsy	28
Hysteria	50
Insanity	2
Vertigo	55
Meniére's disease	1
Miscellaneous	7
Total	865
Fevers.	
Simple fever	27
Intermittent fever	212
Remittent "	5
Typhoid "	6
Total	250
Effects of Heat.	
Heat exhaustion	29
Thermal fever	10
Sun-stroke	2
Total	41
Effects of Over-exertion.	
Debility and exhaustion	266
Faintness and syncope	44
Total	310
Intemperance	10
Miscellaneous medical cases	596
Total medical cases	5,517

IV.—SURGICAL CASES.

Wounds.	
Bites and stings	25
Contused wounds	56
Incised wounds	73
Lacerated wounds	100
Gunshot wounds	3
Punctured wounds	11
Total	268
Accidents and Injuries.	
Scalds	14
Burns	12
Contusions	96
Dislocations	4
Sprains	64
Fractures	12
Fractured larynx	1
Concussions	4
Foreign body in eye	192
Foreign body in ear	1
Foreign body in throat	4
Hernia	4
Hernia (strangulated)	6
Total	414
Miscellaneous surgical cases	262
Total surgical cases	944
Medical cases	5,517
Surgical cases	944
Total	6,461

Affections of the digestive organs.

Cholera morbus

Causes.

Conditions favoring sickness on the part of visitors.

Of the entire number of medical cases, more than one-half (3,199) were connected with the digestive organs. The great majority of these were directly traceable to excesses or indiscretions in eating. On the 11th July, no less than 26 patients with severe cholera morbus were admitted to the hospital in the course of an hour and a half, all of whom had been taken ill soon after partaking of a lunch of pie and milk at one of the restaurants. This violent outbreak, it was not doubted, was dependent upon some subtle organic change in one of the articles mentioned, by which it had acquired highly irritant poisonous qualities It was stated, however, that probably "sickness was less frequently caused by such spoiled or tainted provisions than by excessive fatigue in very hot weather, by the copious use of iced drinks of all kinds while the body was greatly overheated, and by the consumption of indigestible articles of food when in a state of great physical exhaustion. Vast numbers of those who visited the Exhibition did so at great personal and pecuniary sacrifice. Every effort was made, therefore, to condense their visit to all parts of the Exhibition into the shortest possible time. and it is difficult to conceive of the excessive fatigue and exhaustion involved in this attempt. A large proportion of the visitors were women or young persons entirely unfitted for enduring the physical fatigue of a succession of long days, spent on foot. in constant motion, in the midst of vast throngs of people, and with the mind overtaxed with the ever-changing novelties and attractions of the scene Very many of the visitors came from localities whose climates differed widely from that which they here found. They abruptly changed all their habits of living, and, in too many instances, neglected the hygienic rules which are essential to health."

Direct effects of heat.

There were 41 cases in which the sickness was directly traced to the effects of heat. Of these, 29 presented the ordinary symptoms of nervous exhaustion; 10 were recorded as thermal fever; and 2 as sun-stroke.

Nervous diseases.

There were but 2 cases of apoplexy; 28 cases of epilepsy; and a single case of Meniére's disease or labyrinthine vertigo.

Respiratory and circulatory diseases.

There were only 21 cases who were attacked with disturbance of the heart, either due to functional or organic disease; and only 13 cases of hæmoptysis, which occurred among 9,910,966 visitors.

Absence of intoxication.

Only 10 cases of intoxication were brought to the hospital for treatment. There was but a single case of abortion. In one case miscarriage was threatened, but was averted by timely treatment.

Ratio of cases of sickness among visitors.

The ratio of cases of sickness among the visitors for the entire period of the Exhibition was 1 in every 1,533. The following table shows the number of patients treated at the hospital, and the proportion borne to the total number of visitors on the days when the attendance was greatest. The mean temperature has also been placed in connection with the other data

TABLE V.

Amount of sickness in proportion to the number of visitors.

	Number of Visitors to the Exhibition.	Number of Patients treated at the Hospital.	Ratio.	Mean Temperature, Fah.
May 10, Opening Day..	186,672	5	1 in 37,334	56.7
July 4.	56,494½	48	1 in 1,177	82.5
August 24, New Jersey Day.	67,052	60	1 in 1,117	73.7
September 7, Connecticut Day.	75,044	59	1 in 1,272	63.0
September 14, Massachusetts Day.	97,868	80	1 in 1,222	68.2
September 21, New York Day.	134,588	60	1 in 2,243	61.7
September 28, Pennsylvania Day.	274,919	114	1 in 2,411	56.2
October 5, Rhode Island Day.	100,946	48	1 in 2,103	58.5
October 12, New Hampshire Day.	115,422	53	1 in 2,177	45.0
October 19, Delaware and Maryland Day.	176,407	71	1 in 2,484	53.7
October 26, Ohio Day.	135,661	73	1 in 1,852	45.5
October 27, Vermont Day.	108,080	53	1 in 2,039	43.7
November 10, Closing Day.	121,721	31	1 in 3,926	39.7

The drinking-water supplied on the grounds.

During the later months of the Exhibition unfavorable reports were circulated in regard to the purity of the drinking-water supplied to the Exhibition grounds and the neighboring portion of West Philadelphia. Thorough investigation, however, showed that these reports were unfounded.

Analyses.

Purity of the water demonstrated.

Careful analyses were made at short intervals by Dr. C. M. Cresson, which showed that the purity of the water taken from this point of the Schuylkill was fully up to the standard of previous years as well as to that of the water supply of neighboring cities. The most conclusive evidence, however, on this point was drawn from the actual experience of the large number of persons who drank the water freely during the entire period of the Exhibition, but who were not exposed to the various causes of sickness which influenced the Guard and visitors.

As the result of careful study of the question of the sanitary condition of the Exhibition grounds, the Medical Department arrived at the following conclusions:

Conclusions as to the sanitary condition of the grounds.

First. That there is no evidence to show that any special cause of sickness existed there.

Second. That with regard to the supply of drinking-water, in particular, there is no evidence to show that its use predisposed either to typhoid fever or to diarrhœal affections.

Third. That the sickness occurring among the Guard and employees resident within the grounds was due to peculiar causes * * * which were in no way connected with the sanitary condition of the grounds.

Fourth. That the sickness occurring among the visitors, which was actually dependent upon their visit to the Exhibition, was due exclusively to the effects of over-fatigue, indiscretion in eating and drinking, undue exposure to great heat or to inclement weather, etc.

Sanitary statistics of Philadelphia.

Mortality.

Referring to the sanitary statistics of Philadelphia at large during the Exhibition, it appears that out of 10,294 deaths in the city from all causes during the six months from May 10th to November 10th, only 1 333, or 11.8 per cent., were from diarrhœal affections. Of this number 1,232 deaths occurred among children 5 years of age, leaving only 101 deaths from all diarrhœal affections during the entire Exhibition period among adults and children above 5 years of age.

The following table shows the relative mortality from diarrhœal affections during 1876 in Philadelphia and some other large American cities:

Mortality from diarrhœa in large cities.

1876.	Philadelphia.	New York.	Brooklyn.	Baltimore.	Chicago.
Population	825,594	1,054,000	506,233	355,000	420,000
Mortality from diarrhœal affections	1,417	3,782	1,542	866	954
Death-rate from diarrhœal affections per 1,000 living	1.66	3.50	3.04	2.44	2.28

Mortality from typhoid fever.

Next to diarrhœal affections, which caused a mortality of 1,333 out of 2,485 deaths from all zymotic* diseases during the Exhibition period, typhoid fever was more fatal than any other disease of this class. No less than 450 deaths are recorded as having occurred during the six months from this affection; and taking the entire year 1876, the total number of deaths from this cause was 761.

Excessive mortality from typhoid fever in 1876.

During the entire year 1876 there was a much larger amount of typhoid fever in Philadelphia than is usual. This is shown by the following table of the annual mortality from typhoid fever for the past 16 years, with the annual death-rate per 1,000 living.

YEAR.	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876
Population in thousands	565	565	565	565	565	674	674	674	674	674	674	725	750	775	800	825
Total mortality from typhoid fever	281	654	486	648	773	381	367	395	373	409	313	369	382	472	420	760
Annual death-rate per 1,000 living	.49	1.15	.85	1.14	1 36	.56	.54	.58	.55	.60	.47	.50	.50	.60	.52	.91

Rate of mortality.

During the Exhibition period the population may be estimated at 900,000, and this, with a mortality during those six months of 450 from typhoid fever, gives a rate of annual mortality from this cause of 1 per 1,000. It will be seen, on examining this table, that the annual death-rate per 1,000 from typhoid fever during last year was exceeded during the years 1862, 1864, and 1865, while it was very closely approached in 1863.

Excess of mortality due to influx of unacclimated visitors.

The excess over the usual mortality in Philadelphia for a like period, amounted, during the six months of the Exhibition, to about 200 deaths.

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* By zymotic diseases are to be understood all diarrhœal affections; eruptive fevers, such as small pox, measles, scarlatina, etc,; typhoid and malarial fevers; diphtheria, etc.

This unusual mortality from typhoid fever has been ascribed, not to the existence of any special cause of that disease in connection with the Exhibition, nor to the prevalence in an unusual degree throughout the city at large of its ordinary causes; but to the enormous influx of unacclimated visitors, who were rendered additionally liable to the action of morbid influences of every kind by their mode of life while in the city.

The following table shows the ratio of mortality from typhoid fever in Philadelphia to admissions and attendance at the Centennial hospital:

Ratio of mortality from typhoid fever to admissions and attendance at the hospital.

WEEK ENDING		Mortality from Typhoid Fever in Philadelphia	Admission of Visitors to the Exhibition.	Attendance at the Centennial Hospital.
May	13	7	235,251½	14
"	20	10	115,236	19
"	27	12	155,724	51
June	3	10	204,704½	62
"	10	10	233,406	69
"	17	12	216,536	117
"	24	12	232,535	159
July	1	10	210,108	204
"	8	9	315,853	301
"	15	10	174,792½	301
"	22	13	166,744	252
"	29	18	185,464½	259
August	5	22	196,277	205
"	12	23	210,075	282
"	19	26	241,078	276
"	26	31	347,082	334
September	2	29	321,997	348
"	9	24	446,032	347
"	16	12	495,694	359
"	23	31	624,372	359
"	30	15	758,160	349
October	7	29	551,669	398
"	14	21	584,011	307
"	21	10	700,600	322
"	28	13	641,021	336
November	4	15	628,348	322
"	10	16	596,102	211

The following table, comparing the sanitary condition of Philadelphia during the Exhibition period with that of other large cities, is important:

Sanitary condition of Philadelphia compared with that of other large cities.

CITY.	Population in Thousands.	Total Mortality from all Causes.	Annual Death-Rate per 1,000 Living.	Total Mortality from all Zymotic Diseases.	Annual Death-Rate per 1,000 from Zymotic Diseases.	Total Mortality from Typhoid Fever.	Annual Death-Rate per 1,000 from Typhoid Fever.	Total Mortality from Diarrhœal Affections.	Annual Death-Rate per 1,000 from Diarrhœal Affections.
London	3,489	37,592	21.54	6,905	3.99	606	.34	3,149	1.80
Philadelphia	900	10,294	22.77	2,485	5.5	450	1	1,333	2.96
Baltimore	350	4,020	22.97	1,524	9.2	148	.84	652	3.72
Chicago	420	4,927	23.46	2,277	10.8	108	.51	918	4.37
Boston	342	4,144	24.33	1,422	8.3	98	.56	772	4.5
Brooklyn	506	6,453	25.49	2,583	10	53	.20	1,485	5.86
Paris	1,851	23,735	25.63	....	....	1,122	1.21	....	....
New York	1,054	15,492	29.40	5,884	11	168	.30	3,527	6.69
Berlin	980	16,407	33.86	....	....	393	.81	....	....

The claim of Philadelphia to be regarded as the most healthy city in the world, with a population of over 500,000, with the single exception of London, appears from the above to have been successfully vindicated. Favorable sanitary position of Philadelphia.

THE SUNDAY-OPENING QUESTION.

Among the various questions with which the Centennial Commission had to deal, none, perhaps, were more perplexing than the proposition to open the Exhibition to the public on Sundays. It is not proposed here to enter into a discussion of the subject, or even to intimate an opinion upon its merits, but simply to give a brief statement of facts Proposition to open the Exhibition to visitors on Sunday

Although the question had been fully raised and considered prior to the opening of the Exposition, the Commission resolved to admit visitors only on secular days. But the agitation of the subject by no means ceased with this action. The question continued to be canvassed by the people, and to be discussed in its various phases by the public journals. Prominent clergymen and professors of religion were interviewed and their opinions published. The discussions were for the most part temperate and dispassionate, but at times they betrayed considerable warmth and even acrimony. Some of the deliverances on the subject were as curious in sentiment as they were diverse in opinion. Agitation of the subject.

There were many neutrals, embracing professors as well as non-professors of religion, who took no part in the controversy Some of these did not care to express their opinions; others avowed themselves satisfied with whatever action the Centennial Commission might take upon the subject. Neutrals.

The religious element, as a body, asserted itself strongly against the movement, declaring through resolutions, addresses, and other forms of protest, that, to open the Exhibition on Sunday, would not only be a violation of statutory law, but that it would be such a desecration of the divinely-appointed Sabbath as would, in its consequences, work serious injury to the Exhibition and bring reproach upon the Nation. The religious element opposed to the movement.

On the other hand, it was alleged that the proposition involved nothing immoral or illegal, and precedents were cited showing that certain foreign countries had not hesitated to open similar Exhibitions to the public on Sunday. The fact that, in the city of Philadelphia, the Mercantile Library, the Zoological Garden, the Academy of the Fine Arts, and Fairmount Park were open to all persons whatever on that day, was also presented in support of the proposition. It was urged, therefore, that, in the interest of public instruction, the same rule ought to be applied to the Centennial Exposition, thus giving to mechanics, artisans, and laborers an opportunity to visit and study the grand display on the only day which they could afford to devote to that purpose. Advocates of Sunday-opening.

The 6th day of July, at 2 o'clock P. M., was specially set apart by the Commission to receive petitions and hear statements and arguments Petitions, statements, etc.

in favor of and against the proposition to open on Sunday Among the petitions presented was one signed by over 60,000 persons, with another signed by over 500 stockholders, both in favor of the Sunday-opening. The subject was then ably and fully discussed, but the final vote was postponed until the next day, when the Commission adopted the following resolution which had previously been offered by Mr. LATROBE, of Maryland:

Action of the Commission.

Resolution adopted, declining to open the grounds and buildings to the public on Sunday.

> *Resolved,* That the United States Centennial Commission have heard with great respect the statements that have been made to it on the part of those who desire the opening of the grounds and buildings of the Exposition under their charge on Sunday and fully appreciate the sincerity and earnestness with which they have been pressed upon the Commission; nor have they been unmindful of the memorials to the same effect, that are now upon the table. Nevertheless, the Commission are of opinion that their action heretofore in this connection, on the strength of which they do not doubt that many have been induced to contribute their means and the products of their skill and industry to make the Exposition what it is, ought to be regarded as a pledge to the public, which, in good faith, they are bound to keep; and, so believing, the Commission most respectfully decline to make any change in the rule that closes the grounds and buildings upon Sunday.

Vote by States.

The vote on the foregoing resolution was taken by States, and was as follows:

> *Yeas*—Arizona, California, Colorado, Connecticut, District of Columbia, Florida, Illinois, Indiana, Iowa, Kansas, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Nebraska, Nevada, New Hampshire, New York, Ohio, Pennsylvania, Rhode Island, Texas, Utah, Vermont, West Virginia, Wisconsin, Wyoming—30. *Nays*—Alabama, Arkansas, Dakota, Georgia, Idaho, Missouri, Oregon, South Carolina, Washington Territory—9.

Select parties admitted on Sunday through private gates.

Notwithstanding this action, however, a practice was inaugurated of admitting select parties to the Centennial grounds on Sunday through private gates Memorial Hall and its Annex being kept open, a good opportunity was afforded to view the rare works of art which they contained, and many persons who did not scruple thus to employ the day gladly availed themselves of the privilege when it was extended At first the courtesy was limited to the few, but as the Exhibition neared its close, the number was so increased as to attract the attention of the Commission, when measures were ordered to prevent the violation of the rule which had been established. The practice was, nevertheless, continued, and during the last two or three Sundays of the Exhibition, parties were admitted on complimentary tickets, singly and in groups which aggregated thousands, whilst many more thousands, who would gladly have paid their way, were compelled to remain outside the enclosure.

The Permanent Exhibition Company open their doors to paying visitors on Sunday.

It is proper to remark in this connection, that the Permanent Exhibition Company—the successors to the Centennial Exposition—resolved, some time after their opening day, to admit paying visitors on Sunday. The scheme gave great dissatisfaction to a large number of people, however, and some who had previously encouraged the Exhibition immediately withdrew their exhibits and patronage. After a trial of a few weeks, the result was so different from what had been anticipated by the projectors of the movement that the experiment was abandoned.

The experiment abandoned after a brief trial.

THREE NOTABLE DAYS.

The Opening Day, the Fourth of July, and the Closing Day were the three principal days in the Centennial calendar, and on each of them formal ceremonies were conducted according to a set programme.

On the Opening Day, May 10th, the ceremonies were held in the open air on the terrace between Memorial Hall and the Main Building, beginning at 10.30 A. M. The order of exercises was as follows: 1. National Airs, by an orchestra of 160 performers, under the direction of Mr. Theodore Thomas. These comprised the Washington March, and airs of the Argentine Republic, Austria, Belgium, Brazil, Denmark, France, Germany, Great Britain, Italy, Netherlands, Norway, Russia, Spain, Sweden, Switzerland, and Turkey, ending with Hail Columbia. 2. The entrance of President Grant and distinguished guests. His Majesty Dom Pedro II, Emperor of Brazil, was the only foreign ruler who graced the occasion with his presence. The other foreign powers were represented by ambassadors and ministers. 3. The Grand Centennial March, by Richard Wagner. Herr Wagner was engaged to write this March expressly for this purpose, and the Women's Centennial Commission paid him $5,000 for the work. Theodore Thomas's orchestra rendered this part of the programme. 4. Prayer, by Rev. Matthew Simpson, D. D., Bishop of the Methodist Episcopal Church. 5. Hymn, by John Greenleaf Whittier, set to music by John K. Paine, and sung by a chorus of 1,000 voices under the direction of Theodore Thomas. 6. Presentation of the buildings to the United States Centennial Commission, by Mr. John Welsh, President of the Centennial Board of Finance. 7. Cantata, by Sidney Lanier, of Georgia, set to music by Dudley Buck, of Connecticut, and sung by the chorus directed by Theodore Thomas. A basso solo in the cantata was sung by Mr. Myron W. Whitney, of Boston. 8. Presentation of the Exhibition to the President of the United States, by Gen. Joseph R. Hawley, President of the United States Centennial Commission. 9. Address of the President of the United States and Proclamation of the opening of the International Exhibition of 1876. As the President pronounced the last words of his address, the signal for the multitude was given by the unfurling of the flag. The chimes began to ring, the first gun of the salute of one hundred guns was fired, and the great choir began to sing the Hallelujah Chorus to the accompaniment of the orchestra and organ. During the performance of the chorus the Foreign Commissioners passed into the Main Building, and took places upon the central avenue, before their respective sections. The Presidential party, with the procession of officiating and visiting dignitaries, home and for-

Opening Day.

Order of exercises.

National airs.

Distinguished guests.

Wagner's Centennial March.

Prayer.

Whittier's Hymn.

Presentation of Buildings.

Cantata by Sidney Lanier.

Presentation of the Exhibition to the President of the U. S.

Address of President Grant.

Unfurling of the flag.

Starting of the Corliss engine.

eign, passed through the Main Building, and a few minutes before 1 o'clock, reached Machinery Hall, and shortly after the President himself, with the assistance of Mr. GEORGE H. CORLISS, of Rhode Island, started the great Corliss engine, and all its connecting wheels and shafts. The whistles were sounded, all the flags hitherto furled were given to the breeze, there was a general huzza from the people, and with this concluding ceremony, the Centennial Exhibition was formally opened to the world.

Ceremonies on the Fourth of July.
Overture by George F. Bristow.
Presiding officer.
Prayer.
Oliver Wendell Holmes' Hymn.
Declaration of Independence read by Richard Henry Lee.
Centennial Hymn, by A. Carlos Gomes, of Brazil.
Poem by Bayard Taylor.
Triumphal march by Dexter Smith.
Oration by Hon. Wm. M. Evarts.
Doxology.

The Fourth of July was appropriately celebrated under the auspices of the Centennial Commission in Independence Square, where, one hundred years before, the Declaration of Independence had been proclaimed to the world. At 10.15 A. M., an overture composed by Mr. GEORGE F. BRISTOW, of New York, was performed by an orchestra under the direction of Professor P. S. GILMORE. In the absence of President GRANT, Hon. THOMAS W. FERRY, President *pro tem.* of the Senate, and acting Vice President of the United States, presided over the ceremonies which followed the overture, and made a brief speech on assuming the dignity. An invocation was then made by Right Reverend Bishop WILLIAM BACON STEVENS, of the Protestant Episcopal Church. A hymn by OLIVER WENDELL HOLMES was sung by a chorus of 1,200 voices. The Declaration of Independence was read by RICHARD HENRY LEE, whose grandfather had offered the resolution to the Continental Congress, "That these United States are, and of right ought to be, free and independent States." Mr. LEE read from the original document, which had been brought from Washington to grace the grand occasion. The next number on the programme was "A Hymn for the First Centennial of American Independence, composed by A. CARLOS GOMES, of Brazil, at the request of his Majesty, DOM PEDRO," which was performed by Gilmore's orchestra. The Emperor was present during the rendition of the grand composition. BAYARD TAYLOR then recited a poem composed in commemoration of the day. A triumphal march, "Our National Banner," followed, being a combined effort by the orchestra and the chorus. The words were written by DEXTER SMITH. The oration of the day was then delivered by Hon. WM. M. EVARTS, of New York. The singing of the doxology ended the ceremonies.

Exercises on Closing Day.
Music.
Prayer.
Address by Hon. Daniel J. Morrell.
Address by Mr. John Welsh.

The closing exercises of the Exhibition on November 10th were held inside of Judges' Hall, owing to inclement weather which prevented the contemplated open-air ceremonies. At 2 P. M., after Wagner's Inauguration March had been played by Thomas's orchestra, Gen. HAWLEY announced the beginning of the ceremonies. Prayer was offered by Rev. J. A. SEISS, D. D., pastor of the Church of the Holy Communion. The orchestra then rendered Bach's Chorale and Fugue, after which an address was delivered by Hon. DANIEL J. MORRELL, Chairman of the Executive Committee of the Centennial Commission. Selections from the Dettingen Te Deum by the chorus and orchestra next followed. An address was made by Mr. JOHN WELSH, President of the Board of Finance. The orchestra then performed the finale of the fifth symphony of Beethoven, after which Hon. A. T. Goshorn, Director General, delivered an address. The Hallelujah Chorus by the chorus and orchestra was next in order, followed by a speech by Gen. Joseph R. Hawley, President of the Centennial Commission. "America" was then sung by the entire assemblage, a salute of forty-seven guns, one for each State and Territory, was fired from George's Hill by the Keystone Battery, and, simultaneously, from the United States steamer "Plymouth" in the harbor. A Federal salute of thirteen guns had been fired in the same way at sunrise. At the end of the performance of the national air, President Grant declared the Exhibition closed. At 3.40 P. M. the signal was transmitted by telegraph to stop the large engine in Machinery Hall. The "Old Hundred" doxology was then sung by the audience, and the Exhibition was formally concluded.

Address by Director General Goshorn.

Address by Gen. Hawley.

Grand salute.

The Exhibition declared closed, and the Corliss engine stopped.

Doxology.

CALENDAR OF IMPORTANT EVENTS.

MEETINGS, PARADES, REGATTAS, ETC.

Calendar of important events.

May 10. Opening of the Centennial Exhibition at Fairmount Park, by the President of the United States, in presence of members of Congress, Supreme Court, Cabinet, and many other National, State and Municipal officers, and over one hundred and fifty thousand people. The Emperor and Empress of Brazil were present participating in the ceremonies, which were grand and impressive.

May 16. American Master Mechanics' Association.

May 18. Butchers' procession.

May 23. Session of True Templars.

May 24. The Judges of Awards were initiated, with speeches, toasts and congratulations.

May 29. The Bankers of the United States held a reunion on the occasion of opening their special building.

May 30. Decoration Day.

June 1. Grand parade of the Knights Templar of the United States, under the auspices of the Grand Commandery of Pennsylvania.

June 5. Parade of German Catholic Benevolent Societies.

June 7. Sixteenth annual session of the U. S. Brewers' Congress assembled at Maennerchor Hall. Dedication of the Brewers' Building, Centennial grounds.

June 12. Site of the monument to Richard Allen, first bishop of the African M. E. Church of the U. S., dedicated in the Centennial grounds.

June 12. Women's International Temperance Convention.

June 13. Eighth annual convention of the American Society of Civil Engineers commenced at the Judges' Pavilion, Centennial grounds.

June 15. The Sons of Temperance of America convene and dedicate a free ice-water fountain on the Centennial grounds.

Calendar of important events.

June 15 to 30. Trial of Mowing-machines, tedders, and hay-rakes, held at Schenck's Station, near Philadelphia, by Agricultural Bureau.

June 19. Annual Regatta of the Philadelphia Yacht Club. Course, from Shackamaxon Street to Delanco and back—25 miles. Prize of first class won by the yacht Kate T. Kennedy: time 3.24; second class, Sallie Cox, 3.10; third class, William J. Thompson, 2.52.

June 20. Annual meeting of American Mining Engineers, Judges' Hall, Centennial grounds.

June 22, 23, 26. International Yacht Race (New York Harbor).

June 27. U. S. Military Cadets, West Point Academy, went into camp on the Centennial grounds.

June 28. Centennial National Reform Association met at Horticultural Hall.

June 29. The Remsen Guards, of St. Albans, and the Estey Guards, of Brattleboro', Vermont, escorting Governor Asahel Peck of that State, arrived at the grounds of the Centennial Exhibition.

June 29. American Protestant Association parade.

July 1. Commencement of National ceremonies in honor of the Centennial Anniversary of Independence. Meeting of Congress of Authors in Independence Hall; addresses, odes, anthems and music in Independence Square.

July 2. Centennial Anniversary of the adoption of Richard Henry Lee's resolution of Independence.

July 3. Grand civic torchlight procession of representatives of trades, industries and professions, with clubs, political and social, and the representatives of foreign governments.

———At 12 o'clock, midnight, the new State House Bell was rung the first time; musical ceremonies in the square.

July 3. Parade of U. S. Grand Army of the Republic.

———Centennial service at Christ Church.

July 4. Centennial anniversary of the Declaration of Independence. Parade of volunteer troops from all parts of the Union; exercises in Independence Square; oration by Wm. M. Evarts; poem by Bayard Taylor; Senator Ferry, President of the U. S. Senate, presided. Emperor of Brazil and a large number of distinguished visitors were present; a large chorus and orchestra furnished the music. In the evening a grand display of fireworks was given in Fairmount Park.

———Dedication of the Catholic T. A. B. Fountain in Fairmount Park. Impressive ceremonies and addresses, with a grand procession.

———Monument to Alexander von Humboldt, in Fairmount Park, unveiled.

July 5 to 15. Trial of Reaping-machines, at Schenck's Station, near Philadelphia, by Agricultural Bureau.

July 8. Centennial parade of United American Mechanics. A very large number in line.

Calendar of important events.

July 11. Convention of the American Book Trade Association assembled at Judges' Hall, Centennial grounds.

July 12. Parade of the Loyal Orange Institution.

July 15. Columbus (Ohio) Cadets encamped on the grounds.

July 17. International Educational Convention assembled at Judges' Hall, Centennial grounds.

July 18 to 21. Trial of Thrashing-machines, at Schenck's Station, near Philadelphia, by Agricultural Bureau.

July 19. Annual meeting of the Carriage Builders' Association, at Judges' Hall, Centennial grounds.

July 19. Steinway Day.

August 3. The National Guard of Pennsylvania went into encampment in Fairmount Park between Belmont Mansion and Chamouni. Camp named "Anthony Wayne." Nine divisions were represented.

August 10. Parade of the National Guards of Pennsylvania. See Preliminary Report Pennsylvania Board of Centennial Managers, pp. 53–55.

August 14 and 15. International Scottish Games.

August 15. Seventh annual convention of the National Photographic Association met at Judges' Hall, Centennial grounds.

August 16. Convention of North American Caledonian Association.

August 22. First day of the races of the National Association of Amateur Oarsmen on the Schuylkill at Fairmount Park.

August 23. Grand parade of Knights of Pythias. Nine divisions, embracing about 6,500 men.

August 24. "New Jersey State Day" at the Centennial Exhibition. Paid admissions, 56,325; Exhibitors, complimentary, etc., 8,709; total, 65,034.

August 26. Fire at sheds for storage of packing-boxes, south of Centennial grounds. Four sheds were burned, with their contents.

August 28. Commencement of the International Amateur Regatta.

August 28. Parade of Swiss citizens.

August 29. City Building at Centennial grounds formally opened.

September 1 to 14. Exhibition of horses, in enclosure near Centennial grounds.

September 2. Connecticut National Guard encamp near the grounds.

September 4. Meeting of Archæologists in Ohio State Building, Centennial grounds, at call of Ohio Archæological Association. International Archæological Association formed. Also, the American Anthropological Association.

September 4. International Medical Congress assembled.

September 4 to 8. Exhibition of dogs, in enclosure near Centennial grounds.

September 6. Parade of Volunteer Firemen, embodying many of the old volunteer companies of Philadelphia, with companies from other parts of the Union.

September 7. "Connecticut Day" at Centennial Exposition. Paying

Calendar of important events.

admissions, Main Exhibition, 59,496; live-stock show, 4,463; free admissions, 10,985; total, 74,974.

September 9. Fire at "Shantytown," on Elm Avenue between Belmont Avenue and Forty-second Street, opposite the Main Exhibition Building and extending to Columbia Avenue. Exhibition places, side shows, beer saloons, and other wooden buildings destroyed. Loss about $50,000.

September 10. The associated pioneers of California held a reunion.

September 12. Fifth annual session of the National Agricultural Congress commenced at Judges' Pavilion, Centennial grounds.

——International rifle matches.

September 14. "Massachusetts Day" at Centennial Exhibition. Admissions to Main Exhibition, 78,977; live-stock show, 6,818; total, 85,895. Free admissions, etc., 12,075; total, 97,968.

September 20. Grand parade of the Independent Order of Odd Fellows Estimated number of members in line, 15,000.

September 21 to October 4. Exhibition of neat cattle, in enclosure near Centennial grounds.

September 21. "New York Day" at the Centennial Exhibition. Paying visitors at Main Exhibition, 118,719; live-stock show, 3,284. Free admissions, 12,585; total, 134,588.

September 28. "Pennsylvania Day" at the Centennial Exposition. Receptions by Governor Hartranft and Mayor Stokley. Orations, music, etc. Illuminations and a grand display of fireworks in the evening. There were 251,332 at the Main Exhibition and 5,837 at the live-stock exhibition. Total of paying admissions, 257,619; free admissions of exhibitors, etc., 17,750; total, 274,919.

——Parade of the U. O. O. F. (colored).

——Session of the International Code Conference of America commenced at the Judges' Pavilion, Centennial grounds.

September 28. Annual meeting and dinner of the Constitutional Convention Association, composed of members of the convention of 1873, held at Belmont, Fairmount Park.

October 2. Meeting at the Board of Trade Rooms to consider the advisability of forming a company to purchase the Main Exhibition Building, with a view of having exhibitions hereafter. Committees were appointed and other work done.

October 3. Convention of American Bankers held at Judges' Hall, Centennial grounds.

October 5. "Rhode Island Day" at Centennial Exhibition. Paid admissions to Main Exhibition, 88,977; live-stock exhibition, 83; free admissions, 11,886. Total, 100,946.

——A portion of Lauber's Restaurant, Centennial grounds, burned. Loss, $8,000.

October 6. The American Fish Culturists' Association met in Judges' Hall, Centennial grounds.

Calendar of important events.

October 10 to 18. Exhibition of sheep, in enclosure near Centennial grounds.

October 10 to 18. Exhibition of swine, in enclosure near Centennial grounds.

October 12. "New Hampshire Day" at the Centennial Exhibition. Admissions to Main Exhibition (paid), 100,633; live-stock exhibition, 908; free admissions, etc., 13,881. Total, 115,422.

————Monument and statue to the memory of Christopher Columbus, procured by the Italians of Philadelphia, dedicated in the Centennial grounds.

October 13. Cadets of Military Institute of Virginia encamp on the grounds.

October 17. Pittsburg Public School Day.

October 18. "Reading Day" at the Centennial Exhibition. Admissions to Main Exhibition (paying), 123,857; to live-stock exhibition, 920; free admissions, 14,097. Total, 138,874.

October 19. "Delaware and Maryland Day," ending with a tournament, etc. Admissions to Main Exhibition (paying), 161,355; free admissions, 15,052. Total, 176,407.

October 20. Monument statue in memory of John Witherspoon, signer of the Declaration of Independence, dedicated in West Fairmount Park.

October 23. Mayor Stokley is officially informed that the British Government intend to present St. George's House, in Fairmount Park, to the city of Philadelphia.

October 26. "Ohio Day" and "Merchants' Day" at the Centennial Exhibition. Admissions (paying), 122,300; free, 13,361. Total, 135,661.

October 27. "Vermont Day" at the Centennial Exhibition. Admissions (paying), 95,563; free, 12,517. Total, 108,080.

October 27 to November 6. Exhibition of poultry, in the Pomological Annex.

November 2. "German Day" at the Centennial Exhibition. Admissions (paying), 115,298; free, 12,724. Total, 128,022.

————Monument to Bishop Richard Allen of the African M. E. Church unveiled in Fairmount Park.

November 7. "Women's Day" at the Centennial Exhibition. Admissions (paying), 76,053; free, 11,806. Total, 87,859.

November 9. "Philadelphia Day" at Centennial Exhibition. Admissions (paying), 176,924; free, 16,154. Total, 193,078. In the evening there was a grand display of fire-works by Messrs. Brock & Co., of London, England, and Professor Jackson, of Philadelphia. Banquet by the Centennial Commission and Board of Finance to the Foreign Commissioners at St. George's Hall. President Grant and a portion of his Cabinet, with ministers from foreign countries, were present.

Calendar of important events.

November 10. The Centennial Exhibition was formally closed with appropriate ceremonies. During the 159 days that it was open the paying visitors were 8,004,274; free, 1,906,692. Total, 9,910,966. The free admissions were mainly those of Exhibitors, attendants, and employés.

PHILADELPHIA: THE CENTENNIAL CITY.

Fitting recognition by Congress.

Advantages of Philadelphia.

The wisdom of Congress in selecting Philadelphia as the place in which the Centennial Exhibition should be held has been abundantly demonstrated. By virtue of her historical associations alone, the privilege of forming the centre of the celebration of the One Hundredth Anniversary of American Independence should have been conceded to her without argument, but when her many advantages are taken into consideration, it is difficult to see the grounds upon which any other city could have claimed this honor through superiority.

Her facilities of transportation.

Connections by rail and water.

Unsurpassed system of communication.

The unequalled facilities of transportation enjoyed by Philadelphia have been fully considered elsewhere,* but it will not be out of place to state here that her railroad and navigation facilities are so well developed and systematized that she is brought into direct communication with every part of the country and of the civilized world. The Pennsylvania Railroad, the great highway to the west, the northwest, the southwest, the north, the northeast, and even to the south; the Philadelphia and Reading Railroad and the North Pennsylvania Railroad, both great avenues to the north; the Philadelphia, Wilmington, and Baltimore Railroad, an important means of communication with the south; the Delaware river, navigable by the largest vessels which cross the Atlantic; numerous local railroads, radiating to neighboring parts of Pennsylvania, New Jersey, and Delaware; and several canals for the cheap transportation of heavy freight—these constitute a system of communication which supplies every desired facility, and which cannot be surpassed.

Capacity to lodge and entertain visitors.

Dwelling houses.

Average number of occupants to each dwelling.

The capacity of Philadelphia to entertain a vast influx of visitors was put to the test during the Exhibition, but at no time was there a lack of room, and, as a consequence, prices never became exorbitant. For her ability to provide for the shelter and comfort of an extraordinarily large number of strangers, she may well claim pre-eminence. No other city in the world has so many dwelling houses in proportion to the number of inhabitants. According to the official census taken by authority of the city councils in April, 1876, there were then 143,936 dwelling houses in the city limits, in which resided 817,448 persons, of whom 472,704 were above the age of twenty-one years. The number of males was 398,068, and of females 419,380. The average number of occupants to each dwelling house was less than six, and the average number of adults to each dwelling house was less than four. When compared with cities in which only a small part of the population can devote an entire house to a single family, and the great residue live in tenement houses or flats, Philadelphia's power of absorption will readily be understood.

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* See "Transportation," pp. 158-174.

Power of absorption.

Previous to the Exhibition it was found that the established hotels of the city had an aggregate capacity for about 6,000 guests. These hotels were enlarged, suitable buildings were altered to make new hotels, and special structures were erected, but the aggregate capacity of hotels even then did not exceed 17,000 guests.

Capacity of hotels prior to the Exhibition.

Increase of hotel accommodations.

Realizing the necessity for more extended preparations for the entertainment of visitors, enterprising citizens organized the Centennial Lodging-House Agency for the purpose of systematically utilizing the spare room which was known to exist in all sections of the city. This association contracted with citizens who were willing or desirous to accommodate strangers, and issued tickets which were sold in distant cities or were furnished by special agents on all trains approaching Philadelphia. In this way patronage of the agency was secured. Train agents on the railroads then ascertained which passengers had tickets and furnished each ticket-holder a card assigning him a room, as well as supplying minute directions by which the room could be reached. Thus the city was virtually a large hotel which was never full. The reputation of Philadelphia as "a city of homes" was amply sustained.

Centennial Lodging-House Agency.

Sale and distribution of tickets.

The agency well patronized, and the comfort of visitors secured.

As the Exhibition required a great deal of ground, it was necessarily located outside of the built-up part of the city, thus rendering the question of communication between lodgings and the grounds a matter of the highest importance. In this particular Philadelphia was exceptionally fortunate, and the selection of the Exhibition site was peculiarly happy. Not only were there several lines of street railroads connecting the grounds with all parts of the city, but there were also steam roads which had depots conveniently located in the heart of the city and at the grounds, and they carried an immense number of passengers. A line of steamboats on the Schuylkill river also did a large business conveying passengers from Fairmount to the Exhibition. There were of course numerous cabs and other private conveyances, and lines of omnibuses were established to meet the demand for traveling facilities, but the main reliance was placed on the railroad lines. There were 19 horse railway companies in 1876, having tracks laid upon 245 miles of streets. In 1875 they had in use 1,056 cars, drawn by 6,087 horses, and they carried 85,387,337 passengers, the receipts aggregating $5,631,316. By a system of exchange tickets connection by rail was made with all parts of the city, extending far into the suburbs.

Communication between lodgings and Centennial grounds.

The country surrounding Philadelphia is one abundantly able to supply the demands made upon it for food to sustain the increased population during the Exhibition. It is a very fertile agricultural district, supplying unlimited quantities of meats, poultry, eggs, butter, and vegetables. The short distance to the sea makes fish, oysters, and game plentiful and cheap. In 1876 there were 28 spacious and even elegant market-houses, in which these provisions were offered for sale, and 7 street markets were also used.

Capacity to supply food.

Fertility of surrounding country.

Fish, game, etc.

Markets.

Sanitary condition.

The healthfulness of the city's location can be inferred from actual statistics of mortality. Taking the population of Philadelphia at the beginning of 1876 at the figure of the municipal census, the deaths amount to 22.11 for every 1,000 living persons. This is a lower rate than any other city in the world except London, which was 22.07 in 1872, Paris stood at 24.4, Berlin 24.6 New York 30.1, Rome 32.4, Vienna 34.4. and Madras 37.6.*

Churches, asylums, hospitals, schools, etc.

Libraries and educational institutions.

The religious institutions of the city are very numerous. Churches, asylums, hospitals, and schools are liberally supported by the various denominations. In 1876 there were in Philadelphia 503 religious congregations, including all shades of belief. Many of the churches are models of architectural beauty, and some of the most eminent clergymen of the United States are stationed here. The libraries are well sustained. The Philadelphia Library, founded by Benjamin Franklin in 1731, is one of the oldest institutions of the kind in America. Literary and scientific educational institutions sustain the reputation of Philadelphia as one of the foremost cities of the world. Associations for the dissemination of knowledge and for the advancement of scientific research properly supplement the work of its purely educational enterprises. Aesthetic culture is not forgotten, as is well attested by its various art associations.

Places of amusement.

Scenery.

Fairmount Park.

Public buildings.

The amusement-loving visitors found many pleasures awaiting them in Philadelphia. Its theatres, music halls, summer gardens, zoological gardens and perennial concerts were very attractive, and managers vied with each other in introducing novelties for the entertainment of sojourners. The varied scenery in the vicinity of the city became familiar to excursionists, who traveled up and down the Schuylkill and Delaware in steamboats, and out by railroad to the beautiful suburban towns in the immediate neighborhood. The great Fairmount Park, with its 2,991 acres, a few of which were occupied by the Centennial Buildings, was a most attractive place of resort, and thousands of people carried thence with them ideas of comfort, beauty, and adornment which were destined to make their country homes more inviting. The public buildings were always open to visitors, and their excellent character added to the fame of the city.

Area.

Streets.

Supply of gas.

Water supply.

Fire department.

The area included in Philadelphia is nearly 130 square miles, or 82,600 acres. About 1,200 miles of streets have been opened and over 600 paved. They were lighted at the beginning of 1876 by 10,729 public gas-lamps. In the houses and buildings and streets there were in use 1,191,393 gas-lights of an average illuminating power of 16.61 candles. The gas-mains extended 672 miles. Water was furnished in every house by pipes connecting with 662 miles of street water-mains, filled from seven great reservoirs. In 1875 there were 15,097,160,069 gallons of water pumped into the reservoirs, which cost the citizens about one cent for 147 gallons. The water was used by the fire department, for public drinking-fountains, and for kitchens, chambers, closets, and bath-rooms. The fire department has for its use 5,363 fire-plugs. There are 32 companies, with 34 steam fire-engines, 4 hand-engines, 13 hose-carriages, and 5 hook-and-ladder trucks, the whole being worked by 389 men and 123 horses. There are 74 public drinking-fountains and 51,214 baths, being a far greater number of baths than are found in any other city in the world. There are 150 miles of sewers and culverts for underground drainage. The streets are usually guarded and the peace preserved by a force of 1,200 patrolmen, 25 turnkeys, 27 lieutenants, 4 captains, a fire-marshal, and a chief of police. In 1875 there were about 11,000 manufacturing establishments, employing in good times about 160,000 hands, having an invested capital of $250,000,000, and producing goods worth $552,000,000. The foreign trade of the city amounts to about $55,000,000 annually, principally with England, Belgium, Germany, and Cuba. In 1875 there were 604 foreign vessels and 501 American vessels engaged in this trade. Grain elevators at Washington Avenue wharf and at Girard Point enable nine vessels to be loaded at the same time. An extensive dry dock, owned by Messrs. WM. CRAMP & SONS, enables repairs to be made at this port on even the largest ocean vessels. The total arrivals coastwise in 1875 were 8,238 American vessels and 1,126 foreign.

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* See page 208.

Fountains, baths, etc.

Sewers.

Police.

Manufactures.

Foreign trade.

In addition to Girard College for orphans, there are nearly 500 public schools, with 95,552 pupils and 1,878 teachers. There are four medical colleges and numerous academies, seminaries, private schools, and other institutions of learning. There are 19 hospitals for the relief of the sick and 3 for treatment of the insane; 15 dispensaries for the supply of medicine and medical attendance to the poor; 21 asylums for orphans and abandoned children; 19 homes for aged men and women; an asylum for the deaf and dumb; 3 institutions for the relief of the blind; 5 asylums for the reformation of fallen women; a home for inebriates; 11 industrial aid societies; 13 assistance societies; 10 soup societies, and many other institutions with charitable objects.

Schools.

Colleges, academies, etc.

Hospitals.

Dispensaries.

Asylums, charitable institutions, etc.

It was eminently fitting that Philadelphia, the first city on the American Continent in the extent, value, and variety of her manufactures, should be selected as the place in which to hold a great industrial exhibition. As the birth-place of American Independence, it was due to her that within her limits should be held the chief ceremonies attending the celebration of the Hundredth Anniversary of that great event. She proved herself equal to the grand occasion. The visitors were hospitably received, well entertained at reasonable prices, subjected to no discomfort in traveling, eating or sleeping, and departed with the universal impression that nowhere could the Exhibition have been located more suitably than in Fairmount Park at Philadelphia.

Philadelphia equal to the grand occasion.

This sketch of the advantages of Philadelphia, as the seat of the Exposition, cannot be more appropriately closed than by introducing the following extracts from a speech by Hon. DANIEL J. MORRELL, delivered in the House of Representatives, December 14, 1870, in support of Bill No. 1,478, to provide for the proposed Celebration of the Hundredth Anniversary of American Independence:

Advantages and claims of Philadelphia as presented to Congress by Mr. Morrell.

Speech of Mr. Morrell.

The place where the celebration should be held is as unerringly designated by historic and patriotic associations as the day and year to be commemorated. When the subject is mentioned, by a common instinct the eyes of the nation turn to Philadelphia as the birth-place and to Independence Hall as the cradle of the American Republic. It was within this hall, still maintained with reverent care, and filled with objects rendered sacred by the touch of the actors in the scene, that the nation sprang into being, heralded by the shouts of patriot thousands, and by the tones of the bell which fulfilled its prophetic legend in proclaiming liberty throughout all the land to all the inhabitants thereof. Other cities were not less patriotic, and Boston may claim to have been advanced in leadership and first in the combat, and to be rich in objects and scenes of patriotic suggestiveness; but Boston has nothing to show in commemoration of Independence Day. That belongs to Philadelphia, and its memories overflow the mind at the sight of Liberty Bell and Independence Hall.

Dispute about the proper locality for the celebration ought not to arise where the instinct of patriotism is regarded; yet if the associations of Independence Day are thrust aside, Philadelphia can still show so many scenes of national interest as to establish a paramount claim to the celebration. It was in Philadelphia that the Continental Congress held its first session, and here the larger part of its labors were performed. It was here that the Father of his Country was called to the command of the Continental Army. Here the Convention for the formation of the Federal Constitution met. The State House, in which its sessions were held, is still standing. Here was the first capital of the "more perfect Union" established by that Constitution, and here resided during the two terms of his office the first President of the United States. Here are the graves of many of the leading spirits of the Revolution, Benjamin Franklin and Robert Morris among the number, and it is here that the sacred mementos of this eventful period of our earlier history most thickly cluster. Near by are the battle-fields of Germantown, Brandywine, and Trenton, and the scenes of the Paoli massacre and of the sufferings of the patriot army at Valley Forge.

If it were merely proposed to hold such a world's fair as was held in London and in Paris, any large city upon our sea-board having sufficient enterprise and liberality might have show of right, and claim some peculiar advantage, and for a merely national display of industrial products the fitness of some of our inland cities could not be wholly disregarded. New York has one of the finest and most picturesque harbors in the world; its communications by land and water are unsurpassed; its accumulations of capital and vast commercial energy make it the most important trading centre of this continent, and one of the first of the civilized world. Its surroundings are more than romantic; they are grand and inspiring; its architecture is generally of a superior character, and its public institutions are an honor to the country. It has a noble park, numerous and capacious hotels, and well-managed and attractive amusements. Perhaps there is not to be seen in the world such an extraordinary spectacle of human activity as Broadway presents during the business hours of every day.

New England was aptly named; for it was, and remains to this time, more like Old England than any other portion of the United States. Boston, its literary and business capital, is in all things a worthy rival of New York, and in many respects presents superior claims to that city as the place for holding a centennial celebration. It is rich in patriotic associations, for the reason that it led in the revolutionary struggle, as it has since led in every contest for liberty. Its public men have generally had the largest experience in public affairs, and have in a great degree directed or governed the country. There is hardly an advantage claimed by New York which Boston cannot equal, and certainly no intelligent foreign visitor would wish to leave our shores without having seen the city which is permitted by common consent to call itself the Athens of America. Doubtless the claims of Boston to the honor of celebrating the centennial of national liberty will find numerous and able advocates on this floor, who will thus be making

Speech of Mr. Morrell.

definite acknowledgment of the obligation sung by the poet of New England; for there has been no time in the history of the country when the representation in this House of the Middle, Southern, and Western States did not owe much of its ability to

> "That vigor of the Northern brain
> Which nerves the world outworn."

Passing from the Atlantic sea-board, we have interior cities which in themselves are expositions of American enterprise and progress wonderful to behold. What a hundred years ago was a French fort is now the great city of Pittsburgh—the Sheffield of America. Chicago, which within the recollection of men now living had no existence, has risen as if by enchantment, and with such rapidity and in such splendor that the fables of the Arabian Nights' Entertainments are eclipsed by its veritable history. Baltimore is a city of great beauty, enterprise, and refinement, and has long vied with New York and Philadelphia in commercial and manufacturing progress. St. Louis is the capital of the Mississippi Valley, and nearly the territorial centre of the Union. It has doubled its population in the last ten years, and as our Western friends are now proposing to remove the national capital to that city, certainly its claims to the honors of a centennial celebration may not be lightly put aside. Cincinnati, the Queen City of the West, might present very strong claims to this distinguished honor, and so might Louisville. All of these enterprising cities are easily accessible by land and by water, and against none of them can a conclusive objection be urged.

If any contest with Philadelphia is admitted, numerous claimants will spring up with arguments very nearly balanced, yet none can boast the pre-eminent claims which make that city the most fitting spot on the continent for such a celebration. In every light in which it may be viewed, Philadelphia is a city of which every American may justly be proud. If the celebration is to be of an international character, as it should be the foreigners who visit us should be invited to a city which will fairly represent the enterprise, the thrift, the taste, the intelligence, and the Christianity of our country, and which is in all things most characteristically American. The beautiful location of Philadelphia, its cleanliness, healthfulness, and good order, its abundant and excellent markets, its pure water, its public halls and places of amusement, its institutions of learning, charity and benevolence, its churches, schools, libraries, hospitals, asylums, art galleries, and scientific institutions, the comforts enjoyed by its working classes, and the general superiority of their residences, are characteristics which will always secure for it the praise of unprejudiced visitors. Its courts are pure, its great corporations faithfully managed, and the probity of its merchants is as proverbial as the learning and astuteness of its professional men.

New York boasts her superior harbor, but that of Philadelphia is adequate for all requirements. The park of Philadelphia is a gem of nature; that of New York is a miracle of art. Their rival beauties will long be discussed; yet the possession of the romantic Schuylkill river, near which the great poet of Ireland made his home when in America, and which is celebrated in his song, must secure for Fairmount Park the acknowledgment of superiority.

If it is conceded that an industrial exhibition is to be made in the city where the industries are found in greatest variety and perfection, no further enumeration of Philadelphia's advantages or claims needs to be made. New York may justly claim to be the commercial capital, but Philadelphia is certainly the industrial capital of America. To-day Philadelphia is the first manufacturing city on this continent, and the second in the world, London being the first. The census just taken shows that the capital of its citizens invested in manufactures largely exceeds one hundred million dollars, employing one hundred and fifty thousand workmen; and the product of its manufactures amounts to over two hundred million dollars annually. Unlimited command of coal and iron, and nearness to the rich food-producing lands of Pennsylvania, New Jersey, and Delaware, have given Philadelphia superior facilities; but there could have been no

Speech of Mr. Morrell.

such marvelous developments of productive forces if they had not been fostered by wise national legislation. As contrasted with the greed and demoralization caused by the predominance of foreign trade, Philadelphia strikingly exhibits all the beneficial results which flow from the employment of the people in productive industries. Capital and population are fixed and steady, industry is varied to suit all tastes and capacities, invention is stimulated, intelligence is quickened, the people are more constantly employed, the comforts of life are more abundant and more evenly distributed, vice finds a foe in well regulated labor, the tiller of the soil and the common carrier are kept busy and well rewarded, and our own, and not a foreign land, is benefited.

It cannot be objected that Philadelphia is not adequate to the mere business requirements of a great international exhibition. The harbor is commodious, land and water communications are ample, and the city being nearer the centre of mining and manufacturing industry than any of its rivals, transportation and travel will be less costly. The communications within the city and its environs, by means of street railroads, are more complete than can be found elsewhere, and its hotels and boarding-houses are capable of entertaining, at moderate rates, all visitors.

Fairmount Park, in which it is proposed to hold the exhibition, needs no praise. It embraces more than three thousand acres of land and water, and is destined to be the finest city park in the world. It is near the principal thoroughfares and business centres of the city. Railroads touch it on every side, and a beautiful river runs through it. Nature has lavishly endowed it, and it has been and is being improved by art. The work of fitting it for the special purposes of the celebration is now in progress, and long before the 4th day of July, 1876, it will be so improved and adorned that no fitter place for the purpose can be found, and none that will more richly merit the admiration of every visitor.

WORKERS IN THE CENTENNIAL CAUSE.

Services of Mr. John Welsh.

The distinguished services rendered by Mr. JOHN WELSH* in aid of the Centennial cause are proverbial. As early as November 15, 1876, only five days after the close of the Exhibition, it was decided, at an informal meeting of a number of prominent gentlemen of this city, that, as a mark of appreciation of these services, a suitable testimonial should be presented to him. It was known that Mr. WELSH could not be compensated through any of the usual methods; that he would be averse to monumental memorials of any description dedicated to him personally; but it was believed by his friends, that, if the memorial of their grateful acknowledgments could be so shaped as to promote the usefulness of the University of Pennsylvania, whose interests he had already done so much to advance, no objection would come from him. This plan of testimonial was accordingly selected, and, upon the merest suggestion of a committee in charge of the subject that such a form of acknowledgment was to be made, a number of his fellow-townsmen contributed almost spontaneously fifty thousand dollars to carry out the object.

Testimonials from his fellow-citizens.

The consent of Mr. WELSH to such an arrangement having been obtained, and the Trustees of the University having been consulted, it was agreed upon by the Committee representing the contributors to the fund to present the fifty thousand dollars to Mr. WELSH: he determined to present it to the University to endow the Professorship of History and English Literature, and the Trustees resolved that the Chair so endowed should be entitled the "John Welsh Centennial Professorship."

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* Now United States Minister at the Court of St. James, London.

Ceremony of presentation.

The ceremony of presentation took place at noon of the 22d of February, 1877, in the beautiful Chapel Hall of the University, in the presence of the Trustees, the Faculties of Arts, Sciences, Medicine, and Law, the Committee of Citizens, and a large assemblage of ladies and gentlemen peculiarly representative of the numerous good and useful and beneficent works characteristic of Philadelphia.

Prayer by Bishop Stevens.

Dr. Charles J. Stillé, Provost of the University, presided; and, on his invitation, Right Reverend Bishop Stevens invoked the Divine blessing upon the proceedings. The Provost then announced that the Committee of Citizens having requested the Honorable Morton McMichael to represent them and the contributors to the Endowment Fund, that gentleman would now address the audience. This address is reproduced here in its entirety, as well on account of the glowing tribute which it pays to Mr. Welsh and his co-laborers, as because of the descriptive passages contained in it in reference to the Centennial Exposition and the circumstances which gave it birth. Mr. McMichael spoke as follows:

Address of Hon. Morton McMichael.

Mr. Provost, Ladies, and Gentlemen: The Centennial Exposition, by the common consent of those who witnessed it, was the crowning World's Fair of the nations. Intended to commemorate the birth and to mark the progress of a mighty Republic, at peace and anxious to remain at peace with all civilized peoples, it was projected in a catholic spirit that embraced them all as welcome auxiliaries. In this spirit in all its belongings, so far as was practicable, it was made to conform to the grandeur of the design; and, that it might be worthy of the hoped-for co-operation, in its larger conditions and in its lesser details it aimed at perfection. If it failed to accomplish what has rarely been vouchsafed to human effort, at least it came as near to such a consummation as any preceding similar exhibition. Attractive it unquestionably was in the site selected for its use, whose ample space was more than sufficient for any demand that could be made on it, and whose fragrant parterres, grass-grown slopes, wooded summits, sunlit plains checkered by shining lakes and sparkling fountains, twilight ravines bubbling and babbling with picturesque streamlets,—while close at hand flowed the placid Schuylkill, and just beyond spread a spacious park, rich in natural beauties,—presented a wide range of diversified scenery, graceful, grateful, and invigorating. Impressive it unquestionably was in the numbers and contrast of the structures that partly occupied its site, from the Indian's wigwam, the hunter's hut, the pioneer's cabin, through English, French, Spanish, Portuguese, Italian, German, Swiss, Swedish, Russian, Brazilian, Japanese, Chinese, Egyptian, Turkish, and other examples of European, Asiatic, and American architecture, up to the palatial edifice, dazzling, ornate, imposing, far-stretching, colossal; the classic temple, majestic in harmonious proportions and serene in enduring granite; the piles of Oriental splendor, gorgeous in gold and ruby, glittering with pearl and silver; above, lofty spire and battlemented turret and swelling dome; below, historic monument and stately bridge and long-drawn avenue, swarming with passers of all complexions and costumes, the whole forming a grand cosmopolitan centre, where visitors from near and far, native and alien, met in friendly intercourse for traffic, observation, and pleasure. Amazing it unquestionably was in its munificent display of God's providence and man's aptitudes; in offerings of the soil, the mine, the quarry, of earth and sea and air; in marvels of invention and

Address of Hon. Morton McMichael.

ingenuity from the furnace and the forge, the mill and the factory, the workshop and the laboratory; machines, some reared with cyclopean force, ponderous in mass, fearful in might, prodigious in movement; others constructed with nicest care, minute, delicate, agile, performing daintiest feats with unerring precision; fabrics woven from tiniest threads and costliest fibres; metals, minerals, porcelains, clays,—fused, wrought, fashioned into all manner of shapes, elegant, quaint, fantastic; precious stones cut with rare device and polished into solar radiance: in brief, all that nature from her exhaustless stores; all that art, whether manifested through the painter's palette, the sculptor's chisel, the plastic hand of the moulder, or the cunning touch of the decorator; all that science with its complex mysteries and subtile processes; all that industry with its myriad manipulations and infinite resources could suitably contribute, were here accumulated in boundless and bewildering profusion. And thus attractive, thus impressive, thus amazing, our "great Centennial" awakened lively interest in remotest regions; while within our own borders, from the Atlantic to the Pacific, and from the St. Lawrence to the Rio Grande, it was the cynosure of all eyes and the theme of all tongues.

For this, my friends; for the present enjoyment it yielded and the future benefits secured; for the delight it afforded to ourselves and millions of our countrymen and tens of thousands of strangers; for the new channels of thought it opened; for the salutary lessons it taught; for the profitable emulations it excited; for the kindly feelings it brought forth; for the national and international amities it strengthened, and for the distinction it conferred on the metropolis in which we dwell, we are mainly indebted to the generous zeal and untiring energy of our own townspeople, and foremost among them to the excellent gentleman in whose honor we are now assembled. Before, however, I say anything of that gentleman and those more directly connected wirh him, I desire to pay a merited tribute to the members of the Centennial Commission, who, through good report and evil report, gave to the work upon which they entered their time, their talents, and their unceasing endeavors. I mention no names, nor is it essential that I should, for in this regard all mouths are filled with their praises, and their deeds live and will live in cordial remembrance. The duty they set themselves to perform was of no ordinary magnitude. To arrange and successfully carry forward a scheme that included in its scope communication with mainland and island on two continents, and that involved solicitations for the temporary loan of valuable objects, even where they had to be transported across stormy oceans; to classify innumerable articles so that all should be found in their right relations, and to dispose of them so that each might be shown to the best advantage; to inaugurate an efficient but lenient system of local administration for the protection of property and the preservation of order in an undisciplined and heterogeneous community; to deal, in matters that keenly roused their prejudices or stirred their susceptibilities, with foreigners ignorant of our laws and unaccustomed to our ways; to do these things well required prevision, calculation, combination, knowledge, study, tact, and perseverance, and these the members of the Commission, to whom I have referred, had in large measure. But notwithstanding their abilities, as the organization under which they acted provided no means for defraying the expense of establishing and maintaining the Exhibition, a supplemental organization was founded. This was the Board of Finance, and as upon it was devolved the task of raising and disbursing enormous sums of money, and a general superintendence of the grounds and buildings and substantial accessories of the Exposition, it was indispensable that they who filled it should be familiar with financial, commercial, industrial, and practical subjects, and that to these general attainments they should add recognized intelligence and unsuspected integrity. On this basis the Board was constituted, and by universal selection Mr. John Welsh was placed at its head.

Mr. Welsh was pre-eminently fitted for the place to which he was called. Accustomed to public affairs, he had the largeness of view needed to comprehend the vastness of

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the field that lay before him, and the insight to appreciate its moral as well as its material significance. Trained in the school that has made the merchants of Philadelphia proverbial for probity and sagacity, and constantly participant in important transactions, he was skilled to cope, wisely and justly, with the most intricate business problems. Cultivated in taste, his judgment matured by many years of varied and instructive experience, he was entirely competent to meet the æsthetic requirements of the position. Gifted with singular equanimity of temper and winning graciousness of manner that softened but did not impair the authority of command; favored with uninterrupted health; always alert, always elastic, always buoyant, he possessed in a remarkable degree the *mens sana in corpore sano*, the sound mind in a sound body, that furnishes the master-key to wholesome action. Equipped with these and kindred intellectual and physical attributes, he was quick to perceive and prompt to execute; shrewd in forecast and diligent in fulfilment; patient of labor and unremitting in its exercise; persuasive in method and vigorous in conduct; neither rashly bold nor timidly cautious; and, as he avoided no proper responsibility and assumed no undue prominence, by conciliatory precept and unsparing example he stimulated and utilized the capacities of his well-chosen and well-endowed associates. It has fallen to the lot of few leaders to be supported by a body combining so many qualities especially adapted to the service on which they were employed, as that he led; it has fallen to the lot of still fewer bodies to be marshaled by a leader so capable of giving these qualities their highest application, as him they followed. And as, to the traits here mentioned, Mr. Welsh joined a faith in his undertaking that never failed him; a bright belief in its ultimate success that no passing clouds of doubt or despondency were permitted to obscure; an unfaltering determination to press onward no matter what obstacles might interpose, his earnestness communicated itself to all within its grasp and inspired a confidence that if triumph were possible he and his co-workers, who shared his convictions and his enthusiasm, would achieve it. And it was achieved. It would not profit to dwell on the painful trials that had to be gone through before that goal was reached. The antagonisms produced by honestly conflicting opinions; the hostilities engendered by unworthy jealousies; the clamors raised by interested rivals; the bitter assaults of misjudging journalists; the imputation of mercenary motives by heedless slanderers; the absence, outside of a limited sphere, of popular sympathy; the denial of government aid; the indifference of government officials; these were among the difficulties to be overcome; and only the courage sprung from unselfish and patriotic impulses could have subdued them.

Happily that courage was not wanting; happily these difficulties were overcome. And now that the battle is over, we who watched its course and saw what they who bore its brunt had to encounter; who saw how manfully day after day they renewed the apparently hopeless contest; how eagerly they pursued every path that revealed a glimpse of promise; with what missionary fervor they labored to convert distant unbelievers; with what tempting allurements they drew hither those whose alliance they coveted; with what eloquent appeals they strove to inflame the cold and convince the doubting;—now that the victory is assured, we, who while the battle lasted gave to those who waged it our warmest wishes and helped them with what help we might of voice and pen and purse and person, have come together to express afresh our commendation of what they did; and to bestow on their chief, their guide, their counsellor, their companion, a testimonial of our respect and gratitude. It would, however, fall far short of what the occasion means to suppose that it is alone for the services he rendered to the Exposition this testimonial is proffered. That those services were abundant—most abundant—no one disputes; that they compelled continual mental strain and frequent sacrifice of bodily ease and comfort many of us know; that they led to magnificent results all the world agrees. Of themselves they would justify any recognition, and certainly they were the motive to the demonstration we are here to make. But great as

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they were, and greatly as we prize and esteem them, they were only the final act of a long career of such,—the crown of a life devoted to noble purposes. It was because Mr. Welsh had been conspicuous in good works, in ministering to those who suffered and raising those who had fallen, in founding hospitals, in promoting education, in expanding the industries and enlarging the commerce of his native city, in performing satisfactorily grave municipal functions, in directing and managing stupendous enterprises, and because in all things he had been true and upright and steadfast, that when the crisis demanded superior qualifications in connection with the Exposition all thoughts were instinctively turned towards him. It is because in this, as in all besides, he

"Hath borne his faculties so meek; hath been
So clear in his great office;"

that speaking for you who hear me, for the various classes you typify, for the eminent men and women from our own and sister States and the distinguished representatives from abroad who were with us during our Centennial period, and for the countless throngs who were gratified and instructed by the superb spectacle he so largely assisted to create; speaking, though not with the sanction yet with the sincerity they were spoken of old, I say to him, in the pregnant words of Holy Writ, "Well done, thou good and faithful servant."

Mr. Welsh: A number of your townsmen, embracing the leading interests of Philadelphia, and embodying, as they believe they do, in their act the sentiment of its whole people, for the reasons I have imperfectly indicated have united in presenting to you this certificate for fifty thousand dollars. This sum, spontaneously contributed by the donors, they have placed absolutely at your disposal without stipulation or reservation, to be used as your own discretion might determine. They knew, for they knew you, that, however agreeable as an evidence of good-will such an offering might be, you would not accept it unless it could be made instrumental to some beneficial end, and they are not surprised that you have applied it to the endowment of a professorship of History and English Literature in this venerable University. Identified as you have long been with its fortunes, prominent as you have been in extending its influence and elevating its character, and deeply concerned as you have proved yourself to be in its welfare, it was most appropriate that you should make this institution, ripe in treasured traditions of the past and glowing with brilliant anticipations of the future, the recipient of your favor. And, sir, having done so, even now, while the applauses of your contemporaries sound in your ears, you can look forward with prophetic vision and enjoy the consciousness that, in the coming years, as successive generations of ingenuous youth crowd these halls, to gather from the lips of the bountiful mother the teachings that are to prepare them for the struggle of existence, as they pause before yonder tablet and read the inscription it bears, they will hail the memory, as we hail the presence of our friend and their benefactor.

During the delivery of Mr. McMichael's address, there were frequent manifestations of applause, and as he closed and Mr. Welsh arose to respond the applause was long continued. Mr. Welsh spoke at considerable length. His address was marked by deep feeling; the audience listened with profound attention and sympathy, and heartily applauded him as he closed.

Mr. John Welsh's address.

Governor Hartranft's address.

To his Excellency, Governor Hartranft, *ex officio* President of the Board of Trustees, was assigned the duty of accepting the Endowment gift from the hands of Mr. Welsh. When he rose to receive it, and to make acknowledgment in behalf of the Trustees, he had a most cordial greeting from the audience. His address was able, eloquent, and appropriate. When the applause which followed it had subsided, the Provost, Dr. STILLÉ, made a few pertinent remarks, which were well received; the benediction was pronounced by the Rev. Dr. BEADLE, and the interesting and impressive ceremonies were closed.

Remarks of Dr. Stillé. Benediction.

The distinguished services of Hon. A. T. GOSHORN, as Director General of the Exposition, have also been appropriately recognized through the presentation to him, by his friends, of a handsome and valuable testimonial. Mr. GOSHORN, although not a citizen of Pennsylvania, proved himself a gentleman whom Pennsylvanians especially delighted to honor. He was invited to meet the citizens of Philadelphia, in the Common Council chamber, in Independence Hall, on the 11th of May, 1877, when the presentation took place. At noon on that day a large number of prominent gentlemen and ladies were assembled to witness the ceremonies. Mayor WM. S. STOKLEY read a brief explanation of the purpose of the meeting, and then introduced Hon. HENRY C. CAREY, the venerable publicist, who in fitting terms presented Mr. GOSHORN with a library of 5,000 volumes, as the testimonial gift of Philadelphians, which he accepted in a brief speech. The gift is estimated to have cost $10,000. There were two hundred subscribers to the fund. Each book bears an engraved crest of arms of the city, bearing underneath the inscription: "This volume is one of a library that was presented May 11, 1877, to Hon. A. T. GOSHORN, as a memento of respect and esteem by the citizens of Philadelphia, for his services in organizing and directing the United States Centennial Exhibition in 1876."

Testimonial to Director General Goshorn.

Remarks of Mayor Stokley.

Presentation address by Hon. Henry C. Carey.

Cost and character of the gift.

But there are many Pennsylvanians who, though they have not been thus honored with public testimonials, have none the less entitled themselves to the lasting gratitude of every true friend of the Exposition by their noble exertions in its behalf.

Other active workers.

Among the eminent names associated with the inception, development, and management of the Centennial Exhibition, there is none more deservedly conspicuous than that of Hon. DANIEL J. MORRELL, the Commissioner for Pennsylvania. When serving as a Representative in Congress, from the XVIIth District of Pennsylvania, his energy, business tact and large familiarity with public men and affairs proved a tower of strength to the few resolute and patriotic spirits, who, in the early days of 1870, presented to him the scheme for the Celebration of the One Hundredth Anniversary of American Independence by holding an International Exhibition at Philadelphia. As Chairman of the House Committee on Manufactures, he obtained, against formidable opposition, the consent of the Committee to report favorably the bill (No. 1,478) to provide for the proposed Celebration. On the 14th December, 1870, he delivered in support of the measure a speech, which was so conciliatory and well-conceived in every respect that it effectually disarmed opposition and ensured success. In the Senate his personal influence among the members of that body was again felt in support of the measure. But it was after the bill had passed both branches of Congress

Hon. Daniel J. Morrell.

Services in Congress.

Reports Centennial bill from Committee on Manufactures.

Speech in favor of the measure.

Influence in the Senate.

Difficulties encountered.

The Commission organized, and Mr. Morrell appointed Chairman of the Executive Committee.

Board of Finance incorporated and organized.

Confidence reposed in Mr. Morrell.

Appropriation by Philadelphia.

and been signed by the President, that the supreme moment arrived for testing the courage, energy, and fertile resources of Mr. Morrell. Congress had indeed sanctioned the project of the Exhibition, and had authorized the appointment of a Commission to make the necessary arrangements for holding it at Philadelphia. But not a dollar had been appropriated in aid of the enterprise, and the Commission had been left without corporate powers and privileges. The question how, under these circumstances, the funds required for so vast an undertaking could be raised, became one of great and serious importance. But Mr. Morrell determined that, if human energy could accomplish it, the problem should be solved and the difficulty surmounted. The Centennial Commission was organized, and he was made Chairman of its Executive Committee, a position which he has held ever since. It was decided to apply to Congress for the incorporation of a distinct body, to be called the Board of Finance, which, with the approval of the Commission, should be entrusted with the task of raising and disbursing the requisite funds. After a long and wearisome delay, the desired legislation was obtained, and the Commission was also invested with corporate powers. The work of organizing the Board of Finance was devolved upon the Executive Committee. Mr. Morrell, as Chairman, immediately took the subject in hand, but in order to its accomplishment, it became necessary to appeal to the citizens of Philadelphia for funds to defray the expenses. The confidence reposed in him during these dark days will be best understood by quoting from the ordinance passed by City Councils, November 4, 1872, appropriating to the Commission $50,000, "to pay the incidental expenses thereof, and for engraving, printing, and opening books of subscription in the several States and Territories, and for such other expenses as may be incurred by them in organizing the Centennial Board of Finance in accordance with the Act of Congress, the warrant or warrants to be drawn by the Mayor upon a requisition therefor by Daniel J. Morrell, Chairman of the Executive Committee, accompanied by bills or vouchers attested by the executive officer of the Commission and approved by the said Daniel J. Morrell."

Co-operation of the Commission and Board of Finance.

Confidence assured.

Though exercising different functions, the Commission and Board of Finance, after the organization of the latter, May 1, 1873, were influenced by a spirit of harmony and co-operation throughout, and the grand result of their joint efforts is known to the world. Before the two bodies had been thoroughly organized, many of the warmest friends of the Exhibition had begun to despair of success, but they were encouraged by the firm faith, cheerful nature, and ceaseless endeavors of Mr. Morrell, and thus was averted a failure which would forever have been a stain upon the good name of Pennsylvania and of the Nation itself.

Work on the buildings.

When the funds necessary to justify the beginning of work upon the Exhibition buildings had been secured—mainly from the City of Philadelphia and the State of Pennsylvania—the numerous matters of detail connected with the other preparations for the Exhibition called for the exercise of the highest executive ability, and in this Mr. MORRELL, as Chairman of the Executive Committee, was not wanting. His untiring energy, his self-denial, his business experience, his skill in harmonizing differences, his good nature, and his readiness to assume grave responsibilities, were equal to every emergency and comprehensive of every want. Others assisted, and nobly assisted, but his example inspired and nerved them all.

Mr. Morrell's speech in Congress.

Liberal extracts from the speech delivered in Congress by Mr. MORRELL, in support of the bill authorizing the Exhibition, are given elsewhere.* Few public efforts have been more fraught with important results to the cause they advocated, and few have won so instant and substantial a victory as this modest speech. Its spirit was conciliatory and not combative. While claiming much for Philadelphia and her revolutionary associations, it gave due credit in graceful terms to other cities. It was the first real intimation conveyed to Congress and the country that Philadelphia and Pennsylvania were in earnest in pressing the scheme for the Celebration which had been proposed. It was truthful and honest in its statements. The art of the demagogue had no part in its preparation. Thus, it disarmed prejudice, carried conviction, and accomplished its patriotic object.

The presidency of the Commission.

Had Mr. MORRELL so desired, he might have been President of the Centennial Commission, but he modestly declined the position, considering that, as Pennsylvania had been made the locale of the Exposition, the highest office in the gift of the Commission should be bestowed upon a gentleman from some other State. The honor fell upon General HAWLEY, of Connecticut, who, in accepting it from the Commission, said: "When you were considering the choice of a President of your body in Committee of the Whole, in the last informal ballot I gave my vote and my voice for the Hon. DANIEL J. MORRELL, and had the honor to move the unanimous nomination, which was so heartily carried. It was an election eminently fit to be made. Mr. MORRELL was the early friend of this enterprise in Congress, and as a private citizen. In the vast industrial establishment he conducts, he offers us a splendid example of American labor, capital, and genius, and manifests the executive ability you desire in the office in question. I was painfully surprised when he declined the position."

Gen. Hawley's remarks.

Labors of Mr. Morrell.

The Chairmanship of the Executive Committee to which Mr. MORRELL was assigned imposed upon him multifarious duties and grave responsibilities. To that Committee was referred, primarily, all the important work of the Commission, and its reports and suggestions appear always to have been adopted. It was indeed the strong right arm of the Commission, and through it was mainly accomplished the great work for which that body was created. With the glorious results which followed its action, Mr. MORRELL's name and personal sacrifices will be entwined so long as the story of the Centennial Exhibition is

His reward.

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* See pp. 222-224.

preserved among men. Impartial history will but record the deliberate judgment of his cotemporaries when it declares that he was indeed, from first to last, what he has been publicly styled by one of his associates, "the wheel-horse of the Centennial."

Hon. John W. Forney.
Ex-Governor Bigler.
Mr. Frederick Fraley.
Hon. Thos. Cochran.
Other members of the Board of Finance.

In advancing the interests of the Centennial among foreign nations, and in inducing them to make creditable exhibitions of their productions, the services of that eminent citizen of Pennsylvania, Hon. JOHN W. FORNEY, must not be forgotten. As special Commissioner of the Centennial Commission, delegated to awaken the interest of Europeans in the Exhibition, the value of his work was beyond price. In a corresponding manner, ex-Governor WILLIAM BIGLER, financial agent of the Centennial, exerted himself among the various States, and zealously labored to awaken Americans to the importance of the first and only real attempt to hold an International Exhibition in the United States. Mr. FREDERICK FRALEY, as Treasurer of the Board of Finance, has occupied a most responsible position, but thoroughly organizing his department at the outset, has enabled it to perform with ease and satisfaction the intricate work entrusted to it, and thus shown himself a most worthy and capable custodian of the Exhibition funds. The services of Hon. THOMAS COCHRAN deserve especial mention. By his early activity in procuring contributions, and afterwards by his indefatigable labors as a member of the Board of Finance, he proved a valuable auxiliary in the progress of the Exhibition. Other members of the Board, namely, Messrs. WILLIAM SELLERS, SAMUEL M. FELTON, DANIEL M. FOX, CLEMENT M. BIDDLE, N. PARKER SHORTRIDGE, JAMES M. ROBB, EDWARD T. STEEL, JOHN WANAMAKER, JOHN PRICE WETHERILL, HENRY WINSOR, AMOS R. LITTLE, and JOHN O. JAMES are all entitled to the highest praise for their unselfish exertions in behalf of the Centennial.

Governor Geary.

The late Governor GEARY was noted for the earnestness of his support of the Centennial movement. In his last annual message, and almost in the last words of his life, he warmly commended it to the support of the American people.

Governor Hartranft.
Col. M. S. Quay.

As eminently befitted the Chief Magistrate of the State in which it was to be held, Governor HARTRANFT, by his messages and public addresses, and as Chairman of the Advisory Committee of the State Board, as well as through private efforts, did a noble work in advancing the great project in the favor of the people. The labors of Colonel M. S. QUAY, the efficient Secretary of the Commonwealth, entitle him to high praise. His official and personal influence was most generously and advantageously exercised in securing the framing and adoption of valuable State legislation. He was also a most active and useful member of the Advisory Committee. Hon. HENRY RAWLE, State Treasurer, the remaining member of the Advisory Committee, was at all times zealous in promoting the success of the Management, and especially achieved distinction by his efficient service as Chairman of the Committee of Arrangements on Pennsylvania Day. Hon. MORTON McMICHAEL, as has been shown elsewhere, was as early as December, 1866, in correspondence with Professor CAMPBELL, the originator of the idea of holding an International Exhibition to commemorate the Centennial Anniversary of American Independence. Promptly recording himself in favor of the proposition, Mr. McMICHAEL, from that time forward, during his Mayoralty of the City of Philadelphia, as the head of the Fairmount Park Commission, and as President of the Pennsylvania Board of Centennial Managers, freely and unremittingly devoted his official influence and the power of his editorial pen and eloquent voice to the support of the Centennial cause. Ex-Governor ANDREW G. CURTIN evinced throughout a deep interest in the Exhibition, and made able and convincing speeches in various parts of the country, urging liberal contributions of Exhibits and pecuniary means to ensure success. He was particularly active as a member of the Management, and by his persuasive eloquence before an informal meeting of members of the Legislature, did much to secure the requisite appropriation for the purposes of the State Board.* Hon. JOHN H. SHOENBERGER and Hon. FOSTER W. MITCHELL were both zealous, influential, and highly useful members of the Management, and did excellent work in their respective localities, Mr. SHOENBERGER by inducing the making of Exhibits from the extensive manufactories of Pittsburg and its environs, and Mr. MITCHELL in securing a highly creditable representation from the oil regions. Dr. JAMES A. McCREA, appointed to fill the vacancy in the Board of Managers occasioned by the death of Judge SCOTT, was punctual in his attendance at the meetings of the Board, and contributed excellent service in furthering its objects. Judge ASA PACKER, the Alternate Commissioner for Pennsylvania, was, *ex officio*, a member of the State Board, and aided largely in advancing its purposes by urging a due representation from the Lehigh Valley. The services of

Hon. Morton McMichael.

Ex-Gov. Curtin.

Hon. John H Shoenberger.

Hon. Foster W. Mitchell

Dr. James A. McCrea.

Hon. Asa Packer.

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*At the banquet given at Belmont Mansion, on the evening of July 4, 1873, ex-Governor Curtin, being called upon, spoke as follows, his remarks being frequently interrupted by hearty and prolonged applause:

MR. CHAIRMAN: I would have preferred to remain silent to-night, because everything that I could have said has been so much better said by others that it is unnecessary I should address you. I appreciate the force of the practical remark of the gentleman (ex-Governor Bigler), who has just taken his seat, that it needs now action, not words, to make this hundredth anniversary a success. The omens, however, are all auspicious, for surely the pageant of to-day was a great success; and no one could have failed to admire the dramatic effect of that unfurling of the flag which was the work of the Chairman of this meeting, nor of the accompanying salute to the flag upon the transfer of the grounds to the United States Centennial Commission. Surely no one can be insensible here to the presence of the representatives of the National Government, and of other gentlemen who have so ably represented the States from which they come. The proclamation of the President, the certificate of our Governor, and the eloquent words spoken here to-day are all proper for this celebration of the one hundredth anniversary of American Independence.

But, Mr. Chairman, the celebration of that anniversary was in the hearts of the American people twenty years ago. The men and women of this country, from one end of it to the other, have during that time been looking forward with joyous anticipations to the celebration of the Centennial Anniversary of American Independence. Now, Mr. Chairman, it is very easy for Committees to succeed, and Acts of Congress and proclamations of Presidents and of Governors to be ratified, when it is in the hearts of forty millions of people, independent of Government officials, to celebrate the occasion. No want of support internal or external, and no power on earth can prevent the American people

Mr. Commissioner MORRELL, who was also a member, *ex officio*, of the State Board, have already been referred to. The Legislative Committees, consisting, on the part of the Senate, of Hon. HORATIO GATES JONES, of Philadelphia, Hon. BUTLER B. STRANG, of Westfield, Hon. W. S. McMULLEN, of Oil City, Hon. HARMAN YERKES, of Doylestown, and Hon DAVID A. NAGLE, of Philadelphia; and, on the part of the House, of Hon. J. R. THORNTON, of Pittsburg, Hon. J. MILES JAMISON, of Richborough, Hon. CHARLES R. GENTNER, of Philadelphia, Hon. W. H. GRAHAM, of Allegheny City, and Hon. HARRY HUHN, of Philadelphia, were active, cordial, and efficient in their co-operation with the Board, and had for the most part distinguished themselves in procuring needful legislation.

Legislative Committees associated with the State Board.

Services of Congressmen and Senators.

Hon. Wm. D. Kelley.

Gen. Charles Albright.

In the National House of Representatives there were many noble friends of the Celebration, but among them none worked more effectively or spoke more eloquently in its behalf than Hon. WM. D. KELLEY, whose devotion knew no pause. The valuable services of Gen. CHARLES ALBRIGHT, then a Congressional Representative at large from this State, are also entitled to grateful remembrance. When, in May, 1874, a bill was before the House, proposing to appropriate $3,000,000 out of the National Treasury for Centennial purposes, he gave to the measure his vote, his personal influence, and his power in debate. Hon. SIMON CAMERON and Hon. JOHN SCOTT both labored in the United States Senate for the passage of various measures there discussed in behalf of the Centennial. Mr. CAMERON'S watchfulness of the course of legislation at every stage, with Mr. SCOTT'S convincing speeches, contributed powerfully to the final success which crowned their efforts. First, in the Pennsylvania Senate, and, afterwards, in the United States Senate, Hon. WM. A. WALLACE also gave a telling support to the Exhibition. His efforts in behalf

Hon. Simon Cameron.

Hon. John Scott.

Hon. Wm. A. Wallace.

from giving expression to their emotions of gratitude when the one hundredth anniversary of the birthday of the nation shall have arrived. Patriotism is not fostered by any sectional or local surroundings of county, city or State; but it is that freer and holier sentiment that wells up from the human heart and embraces the whole country. And gathering from the fields of labor of all the people of this great nation, there will come to this classic place three years hence, from the hills and the valleys, representing your agriculture, your mechanism, your labor and your professions, those who will abundantly celebrate this wonderful event in the world's history.

In the City of Philadelphia, it is true, the Declaration of Independence was promulgated to the world. But what was that Declaration? Liberty had struggled for centuries for existence and light. Invited by the promise of civil and religious liberty, the best people of the Old World came to us. Youth, energy, intelligence and enterprise came for the natural enjoyment of their gifts and culture. The sentiment of liberty that, like a thread of gold, had been woven into the woof and web of human affairs, found expression here and was proclaimed to the world in this city. And now in full view of the thousands who are enjoying the blessings of that liberty, will any man tell me that we will not celebrate the One Hundredth Anniversary of this epoch? Of course we will.

Here let me add that the great principle of human freedom in this country is founded upon two great leading ideas. First, that men are born equal; and second, that each man has for himself an account to settle with his Maker, which cannot be done by proxy or agency.

With a government founded upon the great ideas of liberty and rights of conscience, who under heaven will dispute the right of a free people to celebrate their Centennial Anniversary? Why, that man who is not in favor of such a celebration is unworthy of American citizenship.

of the $1,500,000 bill were able and untiring, and justly entitle him to public gratitude.

Services of members of the Pennsylvania legislature.

Hon John I. Mitchell.

In the Pennsylvania House of Representatives, Hon. JOHN I. MITCHELL, of Tioga County, was a staunch supporter of the Centennial, and earnestly advocated all measures which were introduced from time to time favoring appropriations in behalf of the great cause. He enjoyed the privilege of participating in all the legislative discussions bearing upon the Centennial from 1873 to 1876. Hon. ALEXANDER K. McCLURE, then a member of the Senate from Philadelphia, was mainly instrumental in procuring the appropriation of $1,000,000 for the erection of "a permanent Centennial Exposition building," which was approved by Governor HARTRANFT, April 2, 1874. With voice and pen, in public and in private, Mr. McCLURE persistently advocated the most liberal support to the Centennial, and largely assisted in giving the Celebration its excellent start to financial success. Prominent in the support of the $1,000,000 bill above referred to, were Hon. JOHN LATTA, of Westmoreland County, now Lieutenant Governor, then a member of the House; Hon. JAMES S. RUTAN, of Beaver County; Hon. B. B. STRANG, of Tioga County; Hon. LAFAYETTE FITCH, of the Bedford Senatorial district; Hon. MILES S. HUMPHREYS, of Allegheny County; Hon. J. DEPUY DAVIS, of Berks County; Hon. E. A. ALBRIGHT, of the Lehigh Senatorial district; and Hon. W. B. WADDELL, of the Chester Senatorial district—all of whom spoke warmly in its favor. The Philadelphia members were of course favorable to the bill. Among those most active in its behalf were Hon. WILLIAM ELLIOTT, then Speaker of the House of Representatives, and Hon. JAMES B. ALEXANDER and Hon. ELISHA W. DAVIS, members of the Senate.

Hon. A. K. McClure.

Hon. John Latta, and other active supporters of Centennial legislation.

Active supporters of the supplement to the $1,000,000 bill.

The supplement to the $1,000,000 bill, which was approved May 15, 1874, was introduced into the Senate by Hon. JAMES L. GRAHAM, of Allegheny County. Hon. HENRY BUTTERFIELD, of Erie County, and Hon. JOHN I. MITCHELL, of Tioga County, were its warmest supporters in the House. The original bill had authorized an appropriation of $250,000 from the State Treasury, and the imposition of a tax on the passenger railways of Philadelphia to raise the remainder of the $1,000,000; but, as it was found impossible to levy the special tax, and the companies refused to voluntarily appropriate their pro rata assessment, the supplemental act was passed providing for the payment of the entire $1,000,000 out of the State Treasury, provided the Centennial authorities succeeded in raising a like sum from other sources.

Active supporters of the $40,000 appropriation.

Hon. WILLIAM H. VOGDES, of Philadelphia, introduced into the House the bill providing for the appointment of the State Board of Centennial Managers, which was approved by Governor Hartranft, April 12, 1875. No appropriation having been made by this bill for the purposes of the Board, a supplement appropriating $40,000 was introduced into the House by Mr. REIGHARD, of Lycoming County, which, having passed both branches, was approved by Governor Hartranft, March 30, 1876. The most prominent supporters of the supplemental bill were Messrs.

Mitchell and Faunce in the House, and Messrs. Nagle and Strang in the Senate.

Mayor Stokley.

Col. Thomas A. Scott.

Hon. Franklin B. Gowen.

Hon. Henry C. Carey, and other prominent Philadelphians.

As the Chief Magistrate of the Centennial City, Mayor Stokley was equal to the emergency, and by his courteous personal and official bearing, won the good opinion of foreign as well as American visitors. The members of City Councils are deserving of great credit for their personal efforts in behalf of the Exhibition, and especially so for the liberal and timely appropriations which they made to further its success. Col. Thomas A. Scott, President of the Pennsylvania Railroad Company, and Mr. Franklin B. Gowen, President of the Philadelphia and Reading Railroad Company, contributed in various ways to advance the Exhibition, and particularly in the unexampled facilities afforded, and the exceedingly liberal rates charged, in the matter of transportation over their various lines. Amongst leading citizens of Philadelphia who were prominent in their support of the Centennial movement, Hon. Henry C. Carey, Mr. G. W. Childs, Mr. A. J. Drexel, and Mr. Joseph Patterson, are entitled to honorable mention. By judicious and liberal entertainments given by them from time to time to distinguished American and foreign guesst, these gentlemen nobly assisted to sustain the reputation of Philadelphia for the unstinted hospitality of its citizens.

The newspaper press.

Although the important and effective agency of the press has previously been referred to, it is but proper in closing this review of the various prominent auxiliaries, to state that the members of the newspaper fraternity, by their free distribution of information respecting the Exhibition, and by their sleepless vigilance in keeping the subject before the people from its inception to its close, contributed powerfully to achieve a success which otherwise would have been impossible. They have thus entitled themselves to lasting gratitude and imperishable honor.

HISTORICAL AND FINANCIAL REVIEW.

Original design of the Centennial Exposition.

Peculiarities of Congressional action.

Obstacles and discouragements.

The design of the Centennial International Exhibition, when first contemplated, seemed so wildly ambitious that Congress unwillingly sanctioned the stupendous enterprise, and then, instead of assisting the great work, by liberal enactments, it made the task of the originators as difficult as possible. The National Legislature was so lacking in a proper appreciation of the importance of fitly celebrating the One Hundredth Anniversary of American Independence, that, whilst nominally investing the celebration with national characteristics, it sought to impose all the financial burdens upon the patriotic citizens who proposed it, and studiously relieved the United States Treasury from bearing any part of the legitimate expenses of the great enterprise. Any ordinary aggregation of citizens might well have shrunk from incurring the enormous obligation which the Centennial scheme, under such circumstances, would inevitably impose; and the fear of failure, and the consequent loss of reputation, might readily have caused men accustomed to conduct extensive business enterprises to hesitate before assuming the responsibility of a novel enterprise upon an untried basis. But the projectors of the Centennial Exhibition, who subsequently became its managers, boldly took all risks, and in the face of formidable obstacles carried out the original scheme in all its contemplated colossal proportions with triumphant success.

Risks assumed, and success achieved.

The opposition to an International Exhibition, as an appropriate means of celebrating the Hundredth Year of the Republic, was so strong that favorable Congressional legislation was only obtained upon the narrow and unseemly condition that there should be no pecuniary liability in the premises on the part of the United States. Although it was perceived that this would to some extent denationalize the Celebration, yet it was hoped that the Congressional authorization of the Exhibition would of itself create confidence among foreign nations that the enterprise would be properly conducted, and that consequently a larger foreign representation would be secured than if the Exhibition were to be managed by private citizens without any recognition from the Government. The friends of the Exhibition, therefore, accepted the organic law with all its imperfections, believing that Congress would, at subsequent sessions, be more patriotic and liberal, if appealed to for aid and encouragement.

Congressional illiberality.

The United States exempted from pecuniary liability.

Defective legislation accepted, in the hope that subsequent Congresses would remedy the evil.

Among the prominent opponents of the Centennial, in its embryonic days, was the Honorable Charles Sumner, Senator from Massachusetts, who was the author and champion of the *proviso* that "the United States shall not be liable directly or indirectly for any expenses attending such Exhibition, or by reason of the same." So decided was his opposition, that, but a few days before his death, he besought the representatives of the people not to contribute to the purposes of the Exhibition. Although he had been privately and authoritatively assured that the three million dollars then asked would be the maximum required, he yet stated that, if that sum were appropriated, it would involve the country in an expense of from five millions to fifteen millions of dollars. He ridiculed the proposed Celebration and sought to bring it into contempt; and, utterly ignoring the revolutionary traditions and claims of Philadelphia, he asserted that, if an Exhibition was to be held, it ought to be at Washington, as the capital of the nation, or at New York, as its commercial metropolis.

Hostility of Senator Charles Sumner.

His opposition continued up to the period of his death.

His efforts to bring the Celebration into ridicule and contempt.

Mr. Sumner's persistent hostility from the inception of the movement to the time of his death, was extremely damaging to the Centennial cause. His most finished effort in opposition, however, was shown in his attempt to shear the Exhibition of its international features by defeating, if possible, the Act requesting the President of the United States to "extend, in the name of the United States, a respectful and cordial invitation to the Governments of other nations, to be represented and take part in the International Exposition, to be held at Philadelphia, under the auspices of the Government of the United States, in the year 1876." But, though the distinguished Senator put forth his most powerful efforts against the measure, and exhausted argument and eloquence in his endeavor to win

Damaging results of his opposition.

His effort to deprive the Exhibition of its international character.

Able argument of Hon. John Scott.

Passage of the bill to secure foreign representation.

his fellow members to his support, he was completely overthrown and discomfited by Hon. John Scott, of Pennsylvania, who in a masterly speech exposed the false position in which the country would thus be placed, pierced the sophistries of the Massachusetts statesman, disarmed opposition, secured the passage of the bill, and thereby placed the Centennial in a more favorable light among foreign countries.

The usual exemption *proviso* added.

Damaging effect of the *proviso* on the invitation extended by the President of the United States.

Distrust in the minds of foreigners.

But even this concession, small as it was, was not suffered to pass without being encumbered with the usual dead pledge that there should be no pecuniary liability on the part of the United States. Imagine the effect produced on foreign governments and in the mind of foreign exhibitors on receiving "a respectful and cordial invitation" from the President to be represented at the Exposition, to be held "under the auspices of the Government of the United States," coupled with a *proviso* "that the United States shall not be liable, directly or indirectly, for any expenses attending such Exposition, or by reason of the same"! Nothing could have been devised which would be more likely than this to create distrust and suspicion as to the true character of the Exposition, and to intensify the prejudices already existing in the minds of foreigners, who had suffered serious losses from the failure of the New York Exhibition of 1853.

Means of allaying misapprehensions.

Opinions of eminent legal gentlemen.

Foreigners assured of freedom from peril to persons and exhibits on account of debts or mismanagement of the Exhibition.

Special Act of the Pennsylvania Legislature.

Final removal of the difficulty.

A full foreign representation.

In order to allay apprehensions of similar difficulties at the Centennial, the Commission obtained opinions from the Attorney Generals of the United States and of Pennsylvania, and also of distinguished counsel in Philadelphia, showing that Exhibitors and their Exhibits would, under the laws of the United States and of the State of Pennsylvania, be free from any complications or peril from such cause. These opinions were extensively distributed in Europe, and to settle the question finally and beyond doubt, the Pennsylvania Legislature was appealed to by the Centennial authorities, and responded by the passage of an act expressly exempting the persons and property of Exhibitors from ordinary causes of arrest and seizure during the Exhibition. By these means apprehensions were partially removed, but it was only after full and free correspondence between the Centennial authorities and leading gentlemen in Europe, and after several of the principal governments had sent representatives here to make a personal investigation and to learn what actual progress was being made toward the Exhibition, that they became satisfied, and united in sending the full foreign representation which was afterwards enjoyed.

Obstacles to financial success.

Generosity of Philadelphia.

Appropriations of $25,000 and $50,000.

The Celebration was thus beset with difficulties from the beginning, which seriously interfered with its financial success, and its troubles were not easily overcome. The organic act failed to confer corporate privileges on the Commission, while the proviso it contained left it entirely without funds. At this juncture, Philadelphia generously appropriated $25,000 to enable the Commission to organize. When the Board of Finance had been incorporated and funds were required to carry out the preliminaries of the organization, she again came nobly forward, and, through her municipal authorities, placed $50,000 at the disposal of the Commission. These appropriations not only materially aided, but were absolutely essential to the progress of the work.

At an early stage in the preparations for the Exhibition, the active co-operation of the several States was invited. The act authorizing the Celebration at Philadelphia provided for a representation on the Commission of each State and Territory, and strong hopes were entertained that the Legislatures of many of the States would appropriate liberal sums in aid of the contemplated Exhibition. But although a number of them made appropriations for their own Collective Exhibits, no State save Pennsylvania responded with free and direct contributions to the general fund. The appropriations of $100,000 by New Jersey; of $15,000 by the City of Wilmington and the State of Delaware; of $10,000 by Connecticut; and of $10,000 by New Hampshire, were in payment of stock in the Board of Finance, and not as absolute donations. Some of the States showed an utter indifference in regard to the matter, whilst in others the active opposition of expected friends defeated appropriations. The State of Massachusetts, as an instance, was visited, and her people and their representatives evinced a willingness to contribute to the movement. A bill was introduced in the General Assembly, and both branches of that body expressed a desire to co-operate, but an amendment made in the Senate carried the measure back to the House, when Mr. JOHN QUINCY ADAMS, Jr., seized the opportunity to oppose it and ultimately secured its defeat. This action of Mr. ADAMS and of his State illy comported with the patriotic utterances of his great-grandfather, the immortal JOHN ADAMS of Revolutionary fame, who in his last moments predicted such glorious celebrations of the anniversary of the signing of the Declaration of Independence. It gave poor encouragement indeed to the Centennial authorities at that critical period in their struggle to provide the necessary funds for the Exhibition. Such notable failures to sustain the enterprise in its infancy were not only calculated to injure it at home, but, as showing that the country was divided upon the subject, they exerted a most pernicious influence abroad.

Co-operation of States and Territories invited.

Pecuniary assistance hoped for.

Appropriations for State collective displays.

Pennsylvania contributes to the general fund.

Other States take stock.

Indifferent States.

Massachusetts.

Her people anxious to contribute, but their purpose defeated in the Legislature.

Successful opposition of John Quincy Adams, Jr.

Poor encouragement.

In November, 1872, subscription books were opened in the various States and Territories for the sale of stock in the Centennial Board of Finance, the authorized capital of which was $10,000,000, divided into 1,000,000 shares at $10 each. A table was prepared and distributed, showing the population of each of the States and Territories and the amount of stock which they were severally entitled to subscribe within the period of one hundred days from November 21, 1872, inclusive, to March 1, 1873.

Opening of stock subscriptions.

Apportionment of the stock amongst the States and Territories.

At first, subscriptions were rather encouraging, even donations from citizens, amounting to $50,000 being received, and hopes were entertained that the necessary funds could in this way be accumulated.

Subscriptions at first encouraging.

The following table shows the population of the several States and Territories, and the quota of stock assigned to each, with the number of shares subscribed and the amounts actually paid thereon:

Table showing population, quotas assigned, number of subscriptions, and actual payments of stock.

	State or Territory.	Population.	Quota in Shares.	Quota in Dollars.	No. of Shares subsc'bd	Amount Paid.
1	New York..........	4,382,759	113,666	$1,136,660	28,407	$266,922
2	Pennsylvania.......	3,521,951	91,341	913,410	187,218	1,749,468
3	Ohio..................	2,665,260	69,123	691.230	392	3,088
4	Illinois................	2,539,891	65,871	658,710	1,701	15,824
5	Missouri.	1,721.295	44,641	446,410	22	120
6	Indiana..............	1,680,637	43,587	435,870	25	234
7	Massachusetts......	1,457,351	37,796	377,960	3,350	33,462
8	Kentucky............	1,321,011	34,260	342,600	105	1,050
9	Tennessee...........	1,258,520	32,639	326,390	7	64
10	Virginia.............	1,225,163	31,774	317,740	45	354
11	Iowa..................	1,194,020	30,967	309,670	7	66
12	Georgia..............	1,184,109	30,710	307,100	27	270
13	Michigan............	1,184,059	30,708	307,080	240	2,342
14	North Carolina.....	1,071,361	27,785	277,850	12	120
15	Wisconsin...........	1,054 670	27,353	273,530	124	894
16	Alabama............	996,992	25,854	258,540	71	492
17	New Jersey.........	906,096	23,499	234,990	12,720	106,574
18	Mississippi..........	827,922	21,472	214,720	2	20
19	Texas..	818,579	21,230	212,300	18	180
20	Maryland............	780,894	20,252	202,520	858	7,936
21	Louisiana............	726,915	18.852	188,520	121	692
22	South Carolina.....	705,606	18,300	183,000	5	50
23	Maine.......	626,915	16,258	162,580	68	680
24	California...........	560,247	14,530	145,300	945	9,406
25	Connecticut.........	537,454	13.939	139,390	1,872	17,600
26	Arkansas..............	484,471	12,565	125,650	4	32
27	West Virginia......	442,014	11,464	114,640	7	70
28	Minnesota..........	439 706	11,404	114,040	10	100
29	Kansas...............	364,399	9,450	94,500	7	40
30	Vermont........	330,551	8,573	85,730	67	670
31	New Hampshire...	318,300	8,255	82,550	1,054	10,540
32	Rhode Island.......	217,353	5,637	56,370	2,633	26,322
33	Florida...............	187,748	4,869	48,690	25	130
34	Dist. of Columbia..	131,700	3,417	34,170	362	2,982
35	Delaware............	125,015	3,242	32,420	2,107	13,404
36	Nebraska............	122,993	3,190	31,900	83	790
37	New Mexico........	91,874	2,383	23,830	....	....
38	Oregon......	90,923	2,359	23,590	471	2,334
39	Utah.........	86,786	2,251	22,510	....	....
40	Nevada..............	42,491	1,102	11,020	70	700
41	Colorado............	39,864	1,034	10,340	....	....
42	Washington.........	23,955	621	6,210	7	70
43	Montana.............	20,595	534	5,340	13	114
44	Idaho..................	14,999	389	3,890	71	710
45	Dakota...............	14,181	368	3,680	....	....
46	Arizona..............	9,658	250	2,500	124	1,024
47	Wyoming...........	9,118	236	2,360	....	....
	Totals.............	38,558,371	1,000,000	$10,000,000	245,477	$2,277,940

Receipts from stock

It thus appears that the total amount realized from sales of Centennial stock in the States and Territories is $2,277,940. Adding to this the sum of $1,110, which was subscribed in foreign countries, the grand total received on account of stock is two million, two hundred and seventy-eight thousand, nine hundred and fifty (2,278,950) dollars.* Of all the States and Territories, Pennsylvania is the only one which took her quota. She almost doubled hers.

Pennsylvania the only State which took its quota.

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* This statement includes all paid up to December 16, 1876. Further payments have since been made. See Statement of Board of Finance, pp. 243, 244.

Efforts to sell stock.

Effects of the panic of 1873.

Receipts from stock inadequate.

Liberality of Philadelphia and the State.

Total of Philadelphia's appropriations.

Total of Pennsylvania's appropriations.

Of course, after the one hundred days, during which the States and Territories were authorized to subscribe their quotas, had expired, the stock was offered for sale wherever there was a probability of selling it. If the whole amount had been taken, everything would have been accomplished, but in September, 1873, the financial panic occurred, the disastrous effects of which are still felt, and it proved highly injurious to the prospects of the Exhibition. It became painfully evident that a sufficient amount of stock could not be sold, and the Centennial authorities were compelled to look to other sources for means to carry out their project. In this emergency, the City of Philadelphia and the State of Pennsylvania came nobly forward. Philadelphia had already been generous. On the 28th of February, 1872, she had given $25,000; on the 4th of November, 1872, $50,000; and on the 22d of February, 1873, $500,000. She now added $1,000,000 to her former appropriations, making a total of $1,575,000. Pennsylvania had previously appropriated $1,000,000, of which the sum of $250,000 only was to be taken from the treasury, and the residue to be raised by special taxes. She now, on the 15th of May, 1874, appropriated the entire $1,000,000 from the treasury, afterwards giving $40,000 for the purposes of the State Board of Centennial Managers, $15,000 for the Educational Exhibit, and $55,000 for the Military Display, making a total of $1,110,000.

Grand total of contributions made by Philadelphia and the State.

Adding to these appropriations, $1,749,468 for stock, and $50,000 for donations, the grand total of the various sums, exclusive of paid admissions, contributed by Philadelphia and the State for Centennial purposes, is four million, four hundred and eighty-four thousand, four hundred and sixty-eight (4,484,468) dollars.

Congressional aid hoped for.

Efforts made to obtain it.

Memorials unavailing.

Failure of request made through President Grant.

Although Congress had declared that the United States should not be liable for any expenses attending the Exhibition, yet when hard experience had shown the great difficulty of raising the requisite funds, the Centennial authorities were not without hope that an appropriation of some kind would be made by the Government. Efforts were made at every session of Congress for this purpose. On December 9, 1872, a memorial to Congress was adopted by the Commission, asking for "such assistance from Congress as in its judgment may be required by the exigencies of the case," etc., but the desired assistance was not rendered. Other memorials met with the same result. On the 20th of January, 1875, a report on the progress of the preparations for the Exhibition was made to the President of the United States, as required by law, and in it appropriations were asked of $400,000 for the Commission's expenses connected therewith, and $600,000 for police, etc., making a total of $1,000,000. The President transmitted the report to Congress, January 26, 1875, but no action was taken. In this way the Centennial was treated until, after the struggles of the Centennial authorities had enabled them to erect buildings and make necessary preparations, and after a number of members of Congress and Government officials had been induced to visit the Exhibition grounds and see the great work which had

Congress finally induced to make an appropriation of $1,500,000.

been accomplished, the National Legislature was at last induced to make an appropriation. Instead of $3,000,000, which had been prayed for, it gave $1,500,000, in accordance with the following Act, approved February 16, 1876:

Act of Congress.

> That the sum of $1,500,000, to complete the Centennial Buildings and other preparations, be and the same is hereby appropriated out of any moneys in the United States Treasury not otherwise appropriated, which shall be paid on the drafts of the President and Treasurer of the Centennial Board of Finance, one-third immediately after the passage of this Act, and the remainder in four equal monthly payments, provided that in the distribution of any moneys that may remain in the treasury of the Centennial Board of Finance, after the payment of its debts, as provided by the tenth section of the Act of Congress, approved June 1st, 1872, incorporating said Centennial Board of Finance, the appropriation hereinbefore made shall be paid in full into the treasury of the United States before any dividend or percentage of the profits shall be paid to the holders of said stock. Provided, also, that the Government of the United States shall not, under any circumstances, be liable for any debt or obligation of the United States Centennial Commission, or the Centennial Board of Finance, or any payment in addition to the foregoing sum.

Questionable character of the appropriation. Must the sum be refunded to the Government, or be distributed amongst the stockholders?

The question tested in court.

Mr. Justice Strong orders distribution amongst the stockholders.

From the peculiar phraseology of this Act, it was generally considered that the appropriation made by it was absolute, and that no part of the sum was required to be refunded to the Government until after the payment of the debts of the Board of Finance, including its stock (which was held to be a debt), and only then "before any dividend or percentage of the profits should be paid to the holders of said stock." After the close of the Exhibition, however, and whilst the financial affairs of the Board were in course of adjustment, such doubts arose in reference to the true interpretation of the Act as finally led to the arbitrament and decision of the question by the courts. This was really necessary for the protection of the Board of Finance, which did not possess sufficient means both to repay the stock and to refund the appropriation. Proceedings in equity were accordingly instituted before Mr. Justice Strong, in the Circuit Court of the United States for the Eastern District of Pennsylvania, to bring the matter to a judicial test. That eminent jurist decided adversely to the claim of the United States, and made the following decree:

Decree.

> And now, this 19th day of January, 1877, this case came on to be heard upon the bill and answers, and was argued by counsel; whereupon, in consideration thereof, it is ordered and decreed that the complainants do pay and distribute the fund in their hands to and among the several and respective stockholders of the complainants *pro rata*, according to the true intent and meaning of the Act of Congress, approved the 16th day of February, 1876, and it appearing that the said fund is insufficient to pay to the said stockholders the full amount invested by them, it is ordered that no part of the said fund be paid into the treasury of the United States. And it is further ordered, that upon such payment and distribution among the said stockholders being made, the complainants do stand discharged of and from all liability in the premises. And it is further ordered, that the costs in this cause be paid out of the said fund.

The United States Supreme Court

The matter was, however, carried before the Supreme Court of the United States, sitting in banc, and that tribunal reversed the decision of

Mr. Justice **Strong**, and ordered the repayment of the $1,500,000 into the United States Treasury. The following letter to Mr. **Frederick Fraley**, Treasurer of the Centennial Board of Finance, from Hon. R. W. **Tayler**, Comptroller of the Treasury, shows when the repayment to the United States was completed:

reverse the decision of Justice Strong, and order the $1,500,000 to be refunded to the Government.

Treasury Department, First Comptroller's Office,
November 2, 1877.

The repayment into the United States Treasury officially acknowledged.

Sir: Your letter of June 13, 1877, to the Secretary of the Treasury was duly received, with its enclosure of certificate of deposit with George Eyster, Esq., Assistant Treasurer, Philadelphia, on account of advance made by the United States to the Centennial Board of $1,500,000, under Act of Congress, approved February 16, 1876. The sum thus deposited completes the repayment of said sum of $1,500,000, and, as requested, I herewith return to you certain vouchers of payments previously reported by you, and transmitted to this department, and also the bond heretofore filed by yourself and John Welsh to secure the proper disposal of said $1,500,000, which now appears to have been fulfilled by the deposits made with the Assistant Treasurer, and the condition of the bond thus fulfilled. I believe the repayment of the sum advanced to you has been fully made, and your account fully closed, and the bond and vouchers for expenditures, as transmitted to this department, are herewith transmitted to you through the hands of Mr. William M. Taggart, of this office. Please advise me of their receipt.

Very respectfully,
(Signed) R. W. Tayler, Comptroller.

Frederick Fraley, Esq., Treasurer, etc., Philadelphia.

It will thus be seen that, although the Exhibition was professedly held "under the auspices of the United States Government," not a dollar was actually contributed to its purposes from that source, excepting the appropriation made for the Government's own Exhibit.

No actual contribution by the Government, except for its own Exhibit.

The following statement, showing the various sources from which the Board of Finance derived its revenues, and the actual financial condition of its treasury on December 1, 1877, has been kindly furnished by Mr. **Frederick Fraley**, Treasurer of the Board, for publication in this work:

Statement of the Board of Finance.

BOARD OF FINANCE.

Statement, December 1, 1877.

RECEIPTS.

Subscriptions to stock	$2,350,229.50
State of Pennsylvania	1,000,000.00
City of Philadelphia	1,500,000.00
United States	1,500,000.00
Admissions	3,834,290.99
Sale of buildings	290,117.05
Sale of material and furniture	33,140.31
Donations	78,473.22
Miscellaneous Sources	17,235.98
Concessions	236,030.06
Royalties	204,381.10
Medal sales	41,081.35
Interest on accounts	47,608.13
	$11,132,587.69

POST 58, G.A.R.

PAYMENTS.

BUILDINGS.		
Memorial Hall	$1,564,398.56	
Machinery Hall	634,863.48	
Horticultural Hall	367,073.47	
Exhibition buildings	2,659,867.67	
		$5,226,203.18
For erection of fences, bridges, gates, water and gas-works		287,465.77
Paid U. S. appropriation		1,500,000.00
EXPENSES.		
Police Department	477,724.61	
Fire Department	125,197.21	
U. S. Centennial Commission	344,224.82	
Sundry departments	938,871.20	
Engineering, grading grounds, roads and walks	723,481.94	
Ceremonials, music, fireworks, banquets, etc	91,435.76	
Judges of Awards and expenses of department	249,601.75	
Prize medals	27,937.56	
Advertising, printing, salaries, and other expenses of the Centennial Board of Finance	251,808.43	
Closing expenses	38,571.25	
		3,268,854.53
Paid stockholders 17½ per cent		468,985.75
Debts and stocks	191,762.38	
Cash on hand	189,316.08	
		381,078.46
		$11,132,587.69

The foregoing statement will, of course, be changed by subsequent receipts and payments. The Board of Finance is closing up its affairs as rapidly as possible, but several months must necessarily elapse before its final statement can be made. It will be observed that seventeen and a half (17½) per cent. has been paid on the capital stock. What further payment, if any, is likely to be made on that account has not been ascertained. The refunding of the $1,500,000 appropriation to the Government of itself caused a loss of over sixty (60) per cent. on the stock. It would have been extremely gratifying to the Centennial authorities, and indeed to all the friends of the Exhibition, if its shares could have been fully redeemed and a fair dividend paid to the holders. But circumstances have made this impossible. Fortunately, the stock has been so distributed that, it is believed, its depreciation will work but little, if any, injury to individuals. But still more fortunately, there are no clamors of unpaid creditors to mar the generous applause which greets the Centennial Managers as they close their arduous and successful labors in behalf of the great Exhibition.

CONCLUDING REMARKS.

The results of the Exhibition.

The Centennial Exhibition has come and gone. The obstacles which its projectors met and conquered have been fully recounted. A point has been reached whence the American people may take a retrospective glance at the great event, review the work done, and consider the accomplished results.

General success of the scheme.

Rare opportunity for instruction.

Character of the representation.

The wisdom of those who first proposed the mighty gathering is no longer questioned. As a representation of the achievements of the industries of the world, it surpassed the most sanguine expectations. As the Mecca of patriotic Americans, the throng of visitors was beyond all anticipation. Never before was there such a golden opportunity given to the great mass of our people to view the products and study the systems of other lands, and to compare them with those of our own country. Here, as had been promised, was spread out before them a representation made up from all civilized nations, and including all natural and artificial products, all arts, industries, and manufactures, and all the varied results of human skill, thought, and imagination. Here were minerals of every kind and character, and of every degree of value; rare and costly gems and precious stones; innumerable specimens of useful and ornamental woods; fruits and cereals, and plants and flowers from every zone; wonders in chemistry, archæology, geology, and ornithology; relics of by-gone ages; ceramics in endless variety; fabrics of every conceivable texture and pattern; implements of war and of peace; machinery both curious and useful, and in countless forms, from the most delicate to the most powerful; a wondrous display of marine and land animals; and, to crown all, a collection of treasures in Art such as had never before been seen on this continent.

Description in detail of exhibits impracticable.

How a general idea of the Exhibition may best be formed by those who failed to witness it.

No attempt has been made in this work to describe in detail, or to institute comparisons as to the relative merits of the various displays. A library of volumes might be written upon these subjects, and still the half would not be told. The many millions whose great privilege it was to visit the Exhibition may readily recall its vastness and its glories. If those who were less fortunate desire to form some idea of these, let them first turn to and study the plates and descriptions, including the ground-plans, of the Principal Exhibition Buildings such as are presented in this work. They will thus gain an accurate knowledge of the wondrous architectural beauty of these structures, of the immensity of the exhibiting space which they afforded, and of the manner in which that space, all of which was occupied, was distributed amongst the various contributing nations. Let them next turn to the System of Classification, and, observing its wonderful comprehensiveness, remember that the classes were not only all well represented, but that most of them comprised specimens as innumerable as they were varied. It is believed that, with little labor, a better idea of the extent and grandeur of the Exposition may thus be obtained than any other method of description, though drawn by a master hand, could possibly supply.

Who, it may well be asked, could justly and adequately describe in detail the wonders of the Centennial Exposition—that mighty and magnificent array of the world's wealth, displaying in countless shapes and untold numbers the rich fruits of the earth and every conceivable object which man's genius has devised and his plastic hand has wrought? To see and thoroughly comprehend a collection such as this—to study the systems comprised in it, and to examine critically its component parts—would be the work of more than an average lifetime. Many who were on the grounds long before the opening day—who watched the Exhibition during the various stages of its development, and who devoted most of the six months it lasted to an inspection of its contents, confessed, when it was over, how very little they really knew about it. After all they had seen and studied, their view of the colossal display and the knowledge they had acquired respecting it, was in the end admitted to be only superficial. New wonders were continually presenting themselves on every hand. The visitor might arrange and systematize his tours of examination as he would, he was constantly confronted with new and interesting objects, whilst exhibits which he had before passed by, perhaps as unworthy of consideration, were found on subsequent occasions to be replete with beauty, and interest, and attractiveness.

The study of a lifetime.

The American display.

The bosom of the American citizen naturally swelled with patriotic pride as he beheld the magnificent display from his own country. The North and the South, the East and the West, in a spirit of generous rivalry, had been lavish in their contributions of objects; and what one section could not supply had been brought from another. On a collection such as this it might well seem at first that the whole world might be successfully challenged; but as the over-sanguine American moved about among the foreign exhibits, and examined the rare handiwork shown by nations of whom he had before known but little, he was forced to drop unfounded prejudices, and to admit that, great as is the "universal Yankee nation," it has much to learn from those old countries which are so often derided as being behind the age. This proved in many cases a most salutary lesson.

The foreign display.

A valuable lesson.

The Exhibition a source of peace, fraternity, and good will.

A gratifying feature of the Exposition consisted in the opportunity it gave to people from all sections of the Union to meet at the birth-place of the Nation and to exchange fraternal greetings. Unquestionably the occasion did much to soften and remove the lingering asperities and animosities which were consequent upon the War to suppress the Southern Rebellion. Many on both sides who had long been estranged were brought to feel the necessity of "a more perfect union," and to realize how truly good and noble it was to clasp hands in a common cause, for the glory of a common flag, and for the welfare of a common country.

Valuable interchange of views between Americans and foreigners.

Friendly attitude of England and her colonies.

Next in importance to this desirable result was the valuable interchange of views between our citizens and the representatives of foreign nations. The conduct of Great Britain deserves especial praise. Her traditions and those of our own country had long been antagonistic, yet she and her colonies were among the first to accept the invitation extended by the President of the United States to participate in the Exhibition and Celebration. "In their exhibits," said Mr. John Welsh, "they were unsurpassed. In the high character of their representatives we were honored.* They took part, with interest, in our ceremonies, and on every proper occasion they received from our people the most unequivocal evidences of our respect for their sovereign and for themselves. Never before was there such hearty accord between the governments and the people of the two countries."†

Other foreign nations.

It was the same with the representatives of other foreign governments. They met on neutral ground, in the peaceful sunshine of a joyous anniversary, and, laying aside political differences, their talk was of the arts of peace. Our people welcomed them, and mingled with them, and studied their character and exhibits; and they in turn studied ours. The result could not fail to be mutually beneficial. A more perfect understanding of each other has been attained, undue prejudices have been measurably swept away, and the American as well as the foreign citizen is now better enabled to judge men and nations by their actual achievements.

Visit of the Emperor and Empress of Brazil.

The visit of the Emperor of Brazil to the Exposition was one of the most interesting events of the Centennial year. Laying aside for the time the attributes and characteristics of monarchy, he came here as a private citizen, modestly but firmly declining the ovations which would naturally have been showered upon one of his rank. A wise, liberal, and progressive ruler, and a highly cultivated and polished gentleman withal, he won the respect and esteem of our people, and whenever he appeared in public was always greeted with hearty applause. In this popularity the Empress, who accompanied him on his tour, deservedly shared. During his sojourn, the Emperor devoted himself closely to the study of our institutions, and especially to the acquirement of information respecting our system of public improvements. It is believed that what he learned of the success of our people in building railroads was an inducement to the recent awarding of a $6,000,000 contract to Messrs. Philip and Thomas Collins, of Philadelphia, for the construction of the Madeira and Mamore Railroad in Brazil. When it is remembered that the entire work of surveying and building this road has been confided to the contractors, and that, from the manufactories of the Philadelphia and Reading Company, they are also to furnish the iron rails and all the rolling-stock necessary to its complete equipment, it will be seen

Their popularity.

The Madeira and Mamore Railroad.

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* See page 87 (note).

† Mr. Hugh Willoughby Sweny, a member of the staff of the British Commission, in concluding a most interesting article on previous Exhibitions, says: "Thus will the Centennium be worthily celebrated by 'peace and good will to all men;' it is for England and America to set an example to the nations, for this Hundredth Birthday of Young America is not only merely a holiday on one side of the Atlantic, it appeals to all who speak the mother tongue; it is a bell that rings for 'the unity of the English-speaking world;' it tells us how we muster in our strength seventy-six millions of freemen speaking the tongue of Shakespeare, of Byron, of Washington Irving, and of Longfellow, and as the cable joins the lands, so it should join the hands, and with them the hearts; once unite those who speak the old language, whether from the Old Country, from the States, from the Dominion, or from Australasia, and the peace of the world is secured; once agree that 'blood is thicker than water,' and nothing can ever again separate England and America save the Atlantic."

how truly great is the compliment which has thus been paid to American genius and enterprise.

The Brazilian display.

The display made by Brazil at the Exhibition was in every respect creditable. The Emperor has shown his friendship for this country in various ways.

Propositions to increase trade with Brazil.

Efforts are now being made by leading individuals and firms, and propositions are pending in Congress, looking towards closer relations and an increased trade between the United States and the empire of Brazil. It is hoped these may be successful, and that the result will be mutually beneficial to both countries.

Satisfactory results of the American system of awards.

It is the good fortune of the Centennial Exposition that no hint of favoritism clouds the reputation of its efficient judges on awards. The old international jury system, which was always unsatisfactory, broke down at Paris in 1867, and fell into contempt at Vienna in 1873. To Commissioner N. M. Beckwith, of New York, who had represented the United States at both these displays, mainly belongs the honor of introducing and perfecting the American system.

Defects in the old system, and advantages of the new.

Under the old arrangement, the jury in any given group was as far as possible composed of representatives of the countries contributing to that group, and the jurors served without pay or allowance for expenses. When vacancies occurred in the juries, other material not being available on account of the absence of remuneration, those attending the Exhibition were pressed into the service. In most cases these were either interested in the exhibits or were biased in favor of their own countries, which they desired to obtain the greatest number of prizes. Constant jealousies, quarrels, intrigues and dissatisfaction were the inevitable results.

Judges under the American system, their appointment, compensation, and duties.

Under the American system the duties of the Judges were strictly judicial and not representative. One-half were Americans and the other half foreigners, appointed by the different countries. Each American Judge received $600 and each foreign Judge $1,000 to cover necessary expenses. The whole number of Judges was limited to two hundred and fifty (about one-fourth the number at the Vienna Exhibition), and no foreign nation had assigned to it more than twenty, whilst most of them had less than ten each. As there were thirty-six groups, it followed that in every group several countries failed to be represented; so that no country could through its Judges, by any possibility, combine in the interest of its own exhibits. Another defect in the old system was in the mode in which the jurors gave expression to their opinions. They asserted, for instance, that one machine was superior to others, but they failed to designate in what the superiority consisted.

Medals and Judges' reports.

Medals of four or five grades—gold, silver, bronze, etc.—were awarded as degrees of excellence. By the American system a uniform bronze medal was given, but the real award consisted in the report of the Judges, which fully discriminated upon the relative merits of the exhibits. The Judges were selected on account of their purity, ability, and fidelity.

Mode of settling complaints relative to awards.

When complaints of their action were made by exhibitors, the cases were referred to a Committee on Appeals, and they were subsequently reviewed by the Judges on Appeals, and even by the Commission itself, when necessary. A scheme of awards such as this could not fail to commend itself. Like all else connected with the Centennial Exposition, it was adopted with great care and after much deliberation, and its success was complete.

Character and conduct of the American people a credit to the nation.

Nothing, perhaps, could have been more creditable to the nation than the character and conduct of the American people, as exemplified at the Exhibition. Brought together in crowds whose immensity was unequalled in the history of former Expositions, their good behavior was remarkable. Though each was bent on seeing the wonderful display to the best advantage, and readily appropriated to his own use all accessible facilities and conveniences for that purpose, yet as a rule this was done without any undue jostling, or any manifestation of rudeness towards others. Cases of absolute disorder or of impropriety were extremely rare. In European cities such large assemblages are frequently prolific of riots and public disturbances, which require the presence and intervention of armed forces for their prevention and suppression. It must not be forgotten, that, with the Centennial, we had also the excitement incident to a hotly-contested presidential campaign; yet peace and order reigned in triumph through it all. The foreigner saw this, and complimented it; but, as the presence of some powerful intimidating force was lacking, it was difficult for him to assign a reason for it. A phase of the social condition so commendable as this can exist only under a Government which makes its citizens equal before the law, so that each, in having his own rights respected, is bound to respect the rights of others.

Cases of disorder extremely rare.

Excitement of a Presidential campaign.

The Exposition as a school.

Instruction in things practical.

Higher education in art.

The Centennial Exposition was a school of incomparable excellence. Not only did it instruct our people in things practical—in Manufactures, in Machinery, in Agriculture, in Horticulture, and in all the varied products of the Soil and Mine; it provided also for their higher education—the development of their minds in matters of Art. In Memorial Hall and its Annex were contributions of paintings and sculpture from the first galleries in Europe, as well as works by native artists who vied with each other in being represented at their best in the grand competitive display. There are, and of course ever will be, persons who cannot truly appreciate the beautiful in Art, but the master-piece on canvas or in marble rarely fails to captivate the mass. Many who had heard and read of rare Art treasures, but which they had never expected to see, were, through the medium of the Exposition, brought face to face with the objects of their hopes. Their joy over this great and unexpected privilege may readily be imagined. Others who had known but little of the magic power of the artist's pencil and the sculptor's chisel, yet found in the Centennial Art display an attraction which was irresistible, and they returned to their homes in the possession and enjoyment of an aesthetic taste of which they had never supposed themselves capable. If the Exposition had accomplished nothing else, this higher culture, wrought by the Art Gallery, has amply compensated for all it cost.

Cultivation of an aesthetic taste.

European Exhibitions surpassed by the Centennial.

Our progress demonstrated.

Character of the nation abroad.

Increased demand for American products.

Other resulting benefits.

The nation in its second century.

That the Centennial Exposition surpassed the International Fairs at London, Paris, and Vienna was freely admitted by visitors from the Old World. The congratulations are universal that it was held. It has demonstrated the wonderful progress in the arts and sciences and mechanical skill made by our people in a single century, and shown that we are but little behind the older nations in the matter of Art, whilst in many other branches we scarcely have a rival. It has given us a character and standing abroad which had never before been conceded. It has increased the foreign demand for certain kinds of American machinery and articles of manufacture. This has been shown by the testimony of many manufacturers in Philadelphia and other cities who have since received and filled large orders for goods to be shipped to new markets, and some of them to the extreme parts of the world. Moreover, it has, by actual competition, demonstrated the superiority of certain American-made articles over similar ones of foreign manufacture, and taught our own people to prefer these home productions to those from other countries. Indeed, view it as we may, the Centennial celebration has proved a blessing. It has imparted to untold thousands a knowledge, which could not otherwise have been acquired, concerning the mighty resources of this great and ever growing country. It has enlarged their ideas and given a new impetus to their studies and plans for the future. It has rekindled amongst our own people the fires of patriotism, and made them all the prouder of their citizenship in the grand Republic. Their pilgrimage to Independence Hall has added new strength to the bonds which unite the States. The nation, baptized anew at its birthplace, has been fairly started upon the second century of its existence. Let us hope that, in all coming time, as each Centennial anniversary shall occur, a grateful posterity, in the free and full enjoyment of the priceless blessings conferred by the great event which made us an independent people, may even more worthily celebrate the occasion than it was in Eighteen Hundred and Seventy-six.

INDUSTRIES—RESOURCES—STATISTICS.

PENNSYLVANIA

AND

THE CENTENNIAL EXPOSITION:

COMPRISING

THE PRELIMINARY AND FINAL REPORTS

OF THE

PENNSYLVANIA BOARD OF CENTENNIAL MANAGERS,

MADE TO THE LEGISLATURE AT THE SESSIONS OF 1877-8;

TOGETHER WITH A LIST OF

THE OFFICERS AND MEMBERS OF THE BOARD

AND OF THE

ASSOCIATED COMMITTEES;

AN HISTORICAL SKETCH OF THE EXHIBITION

AN ALPHABETICAL CATALOGUE

OF

PENNSYLVANIA EXHIBITORS;

AND A SERIES OF ARTICLES RELATIVE TO THE
INDUSTRIES, RESOURCES AND CAPABILITIES OF THE COMMONWEALTH.

TWO VOLUMES: THREE PARTS: ILLUSTRATED.
VOLUME I—PART II.

PHILADELPHIA:
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1878.

IRON MAKING IN PENNSYLVANIA.

Introduction.—The object of the following sketch is to record. in chronological order and without violence to geographical requirements, the first steps that were taken in Pennsylvania to make iron, and to show the extent of the iron interest of the State at the close of the first century of our national existence. We shall endeavor, first, to record the beginning of the iron industry in each of the iron-producing sections of the State; second, to note in detail the introduction of those radical changes in the business of iron and steel making with which Pennsylvania has been prominently identified; and, third, to present such statistics of the past and present condition of the iron industry of the State as seem to us to be worthy of preservation. It has not been our purpose to preserve a list of all the iron enterprises that have existed in the State, if that were possible; nor to boast of the metallurgical achievements of Pennsylvania ironmasters and their workmen, nor to seek the aid of the geologist and the chemist in describing the iron ores of the State and the conditions under which they are found. We leave these features of the history of ironmaking in Pennsylvania to other hands. The publication of this sketch is believed to be amply justified by the revived interest in our national annals which the Centennial itself has created, and by the great prominence of Pennsylvania among the iron-manufacturing States of the Union. In the development of the iron industry of the nation, Pennsylvania has been in many respects, as will hereafter appear, the pioneer of all her sisters, while she has long been their honored leader in contributing to the quantity and variety of American iron products.

Beginning of the Iron Industry in the United States.—In 1619 the London Company sent workmen to Virginia "to set up three ironworks." The enterprise was at once undertaken on Falling creek, a branch of the James river, and not far from Jamestown. Here iron was undoubtedly made in 1620 and 1621, but on the 22d of March, 1622, most of the workmen were cut off by the Indians and the works were destroyed. No other attempt to make iron in Virginia seems to have been made for about a hundred years. The next attempt to make iron in the colonies was in the province of Massachusetts Bay. A furnace was erected in 1643 on the western bank of the Saugus river, at Lynn, by a company of which John Winthrop, Jr., was the leading spirit. In 1651 a forge had been added to the furnace. The first vessel cast in New England was a small iron pot, cast by Joseph Jenks, Sr., at Lynn, probably in 1644. In 1648 a forge was established at Braintree by Winthrop's company, and in 1652 one was established at Raynham by two brothers named Leonard, at least one of whom had been employed at Lynn. In 1656 the first ironworks in Connecticut seem, to have been established at New Haven by Captain Thomas Clarke. Rhode Island made iron soon after its settlement in 1636. In 1675 a forge at Pawtucket, erected by Joseph Jenks, Jr., was destroyed by the Indians, as were also other ironworks and infant enterprises. Henry Leonard, one of the first ironworkers at Lynn, removed to Shrewsbury, New Jersey, soon after 1664, and there set up probably the first forge in that province. It is stated that in 1682 "a smelting furnace and forge were already set up" in New Jersey, and it is supposed that they were built at Shrewsbury, and were then owned by Colonel Morris. In 1685 Thomas Budd wrote that there was but one ironwork in New Jersey, and that this was located in Monmouth county. Shrewsbury is in this county. Pennsylvania first experimented in making iron about 1692, but the industry was not established until 1716. No iron enterprises were established in New York until after 1734. It is probable that the first ironwork in the State was erected about 1740 by Philip Livingston, on Ancram creek, in Columbia county. The iron industry was revived in Virginia about 1715, Colonel Alexander Spotswood building two furnaces, one of which was on the Rappahannock river, near Fredericksburg. About the same year the manufacture of iron was commenced in Maryland. Principio forge, in Cecil county, was among the first iron enterprises in the State, if it was not the very first. The Carolinas made iron about the same time. North Carolina is entitled to the honor of having first given to Europeans the knowledge that iron ore existed in the American colonies. The discovery was made by the expedition fitted out by Sir Walter Raleigh in 1585.

Beginning of the Iron Industry in Pennsylvania.—Pennsylvania was one of the last of the colonies to begin the development of its iron resources, but it was also one of the last to receive permanent settlers. The Swedes and Dutch, who were its first settlers, alternately holding almost entire possession of its territory down to the granting of Penn's charter in 1681, probably made no iron within its limits. William Penn sailed up the Delaware in the *Welcome* in 1682.

and in a letter written in 1683 he mentions "mineral of copper and iron in divers places" as having been found in his province. In other letters he expresses the wish that the iron and other mineral resources of the province may be developed. In 1692 we find the first mention of iron actually having been made in the province. It is contained in a metrical composition which is preserved in the library of the Historical Society of Pennsylvania, the title of which is as follows: *A Short Description of Pennsylvania:* "Or a Relation what things are Known, Enjoyed, and like to be Discovered in the said province. Issued as a token of good will . . . of England. By Richard Frame. Printed and sold by William Bradford in Philadelphia, 1692." Frame describes in his epic the wild and tame beasts, and the fowl, fish, cereals, fruits, berries, nuts, etc., which are found in the province, and in regard to iron says that at "a certain place . . . about some forty pound" had then been made. This iron was probably made in a common smith's fire.

In 1698 *An Historical and Geographical Account of the Province and Country of Pennsylvania and of West New Jersey in America*, . . . "by Gabriel Thomas, who resided there about Fifteen Years," was published at London, in which mention is made of the mineral productions of these colonies. Alluding to Pennsylvania, he says: "There is also ironstone or ore, lately found, which far exceeds that in England, being richer and less drossy. Some preparations have been made to carry on an ironwork." From this statement by Mr. Thomas we infer that the experiment alluded to by Mr. Frame, which resulted in the production of forty pounds of iron as early as 1692, did not lead at the time to the establishment of an "ironwork." Nor can we learn that the "preparations" mentioned by Mr. Thomas led to any immediate practical results. In 1702 James Logan wrote to William Penn as follows: "I have spoke to the chief of those concerned in the iron mines, but they seem careless, never having had a meeting since thy departure; their answer is that they have not yet found any considerable vein." Bishop, in his *History of American Manufactures*, quotes Oldmixon as mentioning in 1708 a deposit of iron ore called "iron hill" in New Castle county, then in Pennsylvania, between the Brandywine and Christiana; and Mrs. James, in her *Memorial of Thomas Potts, Junior*, says that on the 24th of September, 1717, Sir William Keith, Governor of Pennsylvania, "wrote to the Board of Trade in London that he had found great plenty of iron ore in Pennsylvania."

Two years before the death of Penn in 1718 the first ironworks were established in Pennsylvania. The event is briefly described in one of Jonathan Dickinson's letters, written in 1717, and quoted by Mrs. James: "This last summer one Thomas Rutter, a smith, who lives not far from Germantown, hath removed further up in the country, and of his own strength hath set upon making iron. Such it proves to be, as is highly set by, by all the smiths here, who say that the best of Sweed's iron doth not exceed it; and we have accounts of others that are going on with iron works." Rutter's enterprise was a bloomary forge, called Pool forge, the exact location of which is uncertain, but it was on Manatawny creek, and probably about three miles above Pottstown. Mrs. James visited the spot it is supposed to have occupied, "and could see some remains of the dam, and an excavation in the bank where buildings once stood." Another Pool forge is known to have existed farther up the stream, probably built after the first one was abandoned. Pool forge was attacked by the Indians in 1728, who were repulsed. Bishop says: "A forge is mentioned in March, 1719–20, at Manatawny, then in Philadelphia, but now in Berks or Montgomery county." This reference is undoubtedly to Pool forge.

In Day's *Historical Collections* mention is made by a historian of Chester county of Samuel Nutt, who built a forge called Coventry, in the northern part of Chester county, which "went into operation about the year 1720," and made "the first iron" manufactured in Pennsylvania. Another historian of Chester county contributes to Egle's *History of Pennsylvania* the information that Samuel Nutt did not arrive in this country until 1714. "He took up land, on French creek, in 1717, and about that time built a forge there. A letter written by him in 1720 mentions an intention of erecting another forge that fall." Mrs. James states that Nutt purchased 800 acres of land at Coventry in October, 1718. She claims that Rutter removed in 1714 from Germantown "forty miles up the Schuylkill, . . . in order to work the iron mines of the Manatawny region." In her *Memorial* she gives a *verbatim* copy of the original patent of William Penn to Thomas Rutter for 300 acres of land in Manatawny, dated February 12, 1714–15. Dickinson says positively that Rutter made iron in 1716. Nutt probably made iron at Coventry forge in 1718. Bishop refers to a letter written by Dickinson in July, 1718, stating that "the expectations from the ironworks forty miles up Schuylkill are very great." In April, 1719, Dickinson again wrote: "Our iron promises well. What hath been sent over to England hath been greatly approved. Our smiths work up all they make, and it is as good as the best Swedish iron." Dickinson probably meant Nutt's forge as well as Rutter's. The following obituary notice in the *Pennsylvania Gazette*, published at Philadelphia, dated March 5 to March 23, 1729–30, ought to be conclusive proof of the priority of Thomas Rutter's enterprise: "March 13. On Sunday night last died here Thomas Rutter, Sen., of a short illness. He was the first that erected an ironwork in Pennsylvania." Both Rutter and Nutt were Englishmen, and were men of means and great enterprise. After they had removed up the Schuylkill, Nutt married Mrs. Anna Savage, the widowed daughter of Thomas Rutter. Her first husband, Samuel Savage, had accompanied her father when he went up the Schuylkill to make iron.

Bishop says that "Sir William Keith had iron works in New Castle county, Delaware, erected previous to 1730, and probably during his administration from 1717 to 1726." This enterprise consisted of a furnace and forge, which were located on Christiana creek, and were built about 1725. At that time Delaware was embraced within the limits of Penn's province, and it was here that Keith had discovered the "great plenty of iron ore in Pennsylvania" of which he wrote to the London Board of Trade. There is authority for the statement that the furnace was abandoned before 1730, and that another furnace was erected which never went into blast. Iron was, however, made on the Christiana in bloomaries for several years after 1730.

In Watson's *Annals* the statement is made that "the first built furnace of Pennsylvania was that of Colebrooke Dale (Berks county), built in 1720 by James Lewis and Anthony Morris, of Philadelphia." This statement is supported by the fact that Thomas Potts, Jr., was a resident of Manatawny as early as 1720, where he was acting in 1725 as the agent of his rich relative, Anthony Morris, one of the alleged builders of the furnace. It is further strengthened by the fact that Anthony Morris and Thomas Potts were in 1731 part owners of Colebrookdale furnace, and also part owners when the furnace was torn down and rebuilt by a company in 1734. It is corroborated as to the date by information communicated to us in a letter from Mrs. James, in which she says: "I have a large calf-bound folio ledger of nearly 200 folios of Colebrookdale furnace, marked 'B.' The first date is August, 1728, but there are several pages referring to the first ledger, one of them in 1726. . . . Mention is constantly made . . . of sending 'piggs' to Pool forge, proving that Pool was then in full blast. . . . 'A' would seem to be a large volume, from reference to the folios," and therefore to have covered the operations of a number of years. Mrs. James thinks that it is lost. If it could be found it would doubtless show that Colebrookdale furnace was built in 1720, or a year or two earlier. Mrs. James is of the opinion that Thomas Rutter built the furnace, but she also writes to us that on the title-page of ledger "B," above referred to, the name of Thomas Potts is written in connection with the year 1728. This was *before* Thomas Rutter's death in 1729. In his will, dated November 27, 1728, he does not give the name of any of his iron possessions. The opinion is fairly warranted that Colebrookdale furnace was built by a company, of which Thomas Rutter, Anthony Morris, James Lewis, and Thomas Potts were among the members, with Thomas Potts as their agent—Thomas Rutter being the principal owner. This opinion derives additional plausibility from the following extracts from Thomas Rutter's will, on file in the office of the Register of Wills in Philadelphia:

> "I give and bequeath unto my son Thomas Rutter one-third part of y^{e} one hundred acres of land leased to a furnace company, with y^{e} one-third part of y^{e} said furnace, iron ore, or other appurtenances to y^{e} said one hundred acres of land. . . . I give and bequeath unto my son Joseph Rutter the one-third part of the furnace, iron ore, and other its appurtenances, with the one-third part of one hundred acres of land leased to y^{e} furnace

company, and also two-thirds of my other land adjoining to y^e furnace land; also two-third parts of y^e forge, and of y^e hundred acres of land whereon y^e forge stands"

The furnace here referred to was unquestionably Colebrookdale furnace, and the forge was Pool forge. In the inventory filed with the will, and dated "March y^e 18th, 1729–30," appraisement is made of "two-thirds of the furnace and iron ore and of one hundred acres of land," etc., corresponding to the words of the will. The truth of history will not be violated if we award ungrudgingly to Thomas Rutter the honor of having erected the first blast furnace, as well as the first forge in Pennsylvania.

Colebrookdale furnace was located in Berks county, on Ironstone creek, a branch of Manatawny creek. It stood about eight miles north of the mouth of the stream, and about three-fourths of a mile west of the present town of Boyertown, and about two hundred yards from the Colebrookdale Railroad. Plenty of cinder marks the exact site. A grist and saw mill stands about one hundred feet distant. It would seem that friendly Indians were employed at the furnace, as "Indian John" and "Margalitha" are found in the list of workmen about 1728. In Nicholas Scull's map of Pennsylvania, published in 1759, Colebrookdale furnace is mentioned; and in a list of ironworks existing in Pennsylvania in 1789, and published by Mrs. James, it is again mentioned, although we infer that it was not then active. We have not found the furnace mentioned at any later period. A stove-plate cast at this furnace in 1763, and so inscribed, was exhibited at the Philadelphia Exhibition In 1731 pig iron sold at Colebrookdale furnace "in large quantities." Colebrookdale furnace was sometimes written Colebrook It is an interesting coincidence that the first furnace in England to cast pots, kettles, and other hollow ware by the use of sand moulds was Abraham Darby's Colebrookdale furnace in Shropshire, which he leased in 1709. It was a small charcoal furnace, and had been in existence for a century. Darby converted it into a coke furnace. He died in 1717. As he was a cotemporary pioneer in the iron business, and a Friend or Quaker, as were most of the pioneer ironmasters of Pennsylvania, it is easy to imagine that Penn's colonists should have called their first furnace after Colebrookdale furnace in Shropshire.

After the death of Thomas Rutter in 1729, Thomas Potts, Jr., became the principal owner and manager of the ironworks on the Manatawny, carrying them on with ability and success for many years. He was the progenitor of many noted Pennsylvania ironmasters of the same name in the last and present centuries. Several of his sons intermarried with the heirs of Thomas Rutter and Samuel Nutt. He died in January, 1752, aged seventy-two years. In his will, dated 1747, he leaves his "two-thirds of Colebrookdale furnace and iron mines" to his son Thomas. Tradition says that he was born in Wales.

Soon after Nutt had built his forge at Coventry, it is believed that he built a furnace on French creek, called "Redding." Mrs. James places the date of its erection at about 1720. It is probable that it was the second furnace in the State, Colebrookdale being the first.

In Samuel Nutt's will, dated September 25, 1837, he bequeaths to his wife one-half of his right to a furnace and forge; and to his son-in law, Samuel Nutt, Jr., and his wife, the remaining half of such right. The furnace referred to was undoubtedly Redding, and the forge was Coventry, in the ownership of each of which William Branson was probably an equal partner.

Second Stage in the Development of the Iron Industry of Pennsylvania.—In 1728 there were four furnaces in blast in Pennsylvania, one of which undoubtedly was Colebrookdale. Another was Durham, in Bucks county, where there was also a forge about the same time. The others were probably Sir William Keith's, on Christiana creek, and Samuel Nutt's Redding furnace on French creek. Durham furnace was built in 1727, but its first blast did not take place until the spring of 1728. It was built by a company of fourteen persons, of which company James Logan, who was Penn's secretary, was a member. In November, 1728, James Logan shipped three tons of Durham pig iron to England. In the consolidated exhibit of the ironworks of the Lehigh valley at the Philadelphia Exhibition in 1876, the keystone of the Durham furnace, bearing date 1727, was an interesting feature. In 1728-9 Pennsylvania exported 274 tons of pig iron to the mother country.

There is reason to believe that as early as 1734 there were two Durham furnaces. In Scull's map of Pennsylvania (1759) an old and a new furnace and a forge at Durham are distinctly marked. In 1770 there were two furnaces and two forges at Durham. There were at one time three forges on Durham creek. The first furnace was torn down in 1819, and Long's grist mill was built on its site. The father of the celebrated Daniel Morgan of the Revolution was a charcoal-burner at Durham ironworks. As late as 1780 there were negro slaves employed at Durham, twelve of whom in that year escaped to the British lines. Much of the iron made at Durham was taken to Philadelphia in boats fashioned somewhat as an Indian canoe and first made at Durham; hence the term, afterwards in common use, "Durham boats." These boats were about sixty feet long by eight feet wide. They were sometimes propelled by sails, but most frequently with poles in the hands of men who walked upon footways on each side of the boat. The Durham boat closely resembled the more modern keel-boat.

Iron was made within the ancient limits of Lancaster county at a very early day. Day says the first ironworks in the county are supposed to have been built by a person named Kurtz, in 1726, and that the enterprising family of Grubbs commenced operations in 1728. We have traced the authority for this statement to *Hazard's Register,* volume 8, where there is a fragmentary quotation from the *Lancaster Miscel-*

lany, of information contributed by Redmond Conyngham. From another source we learn that Kurtz was an Amish Mennonite. He probably built a bloomary forge. In Egle's *History of Pennsylvania* it is stated that Kurtz's works were on Octorara creek, and that it is possible that they were thrown into Maryland, south of Lancaster county, after the division line became permanently established. Of the Grubbs we shall speak hereafter. McCall's forge, on Manatawny creek, afterwards Glasgow forge, was built about 1725 by Anthony Morris and George McCall. Spring forge, at Spring Mill, owned by Anthony Morris, was running in 1729, as was Pool forge. These forges were supplied with pig iron from Colebrookdale furnace. Green Lane forge, on Perkiomen creek, twenty miles north of Norristown, was built in 1733 by Thomas Mayberry. The workmen employed here were at one time chiefly negro slaves. This forge was supplied with pig iron from Durham furnace before 1747. Rev. George Michael Weiss is said to have owned it before 1763. Glasgow and Green Lane forges were in operation down to about the middle of the present century. Redding furnace, on French creek, which was undoubtedly the second of the name, was built by Samuel Nutt and William Branson in 1735–6; Warwick furnace, also on French creek, by Samuel Nutt's widow, in 1737; Mount Pleasant, on Perkiomen creek, thirteen miles above Pottstown, by Thomas Potts, Jr., in 1738; Cornwall, in Lebanon county, by Peter Grubb, in 1742; Elizabeth, in Lancaster county, about 1750. Mount Pleasant forge, which was built after the furnace, was in operation as late as 1856. Elizabeth furnace continued in operation until 1856, about one hundred years, when it was abandoned by its owner, G. Dawson Coleman, for want of wood. It was built by Baron William Henry Steigel, a German from Manheim, Charles Stedman, and Alexander Stedman. Steigel named the furnace in honor of his wife. About 1775 he failed in business, when the furnace was operated for a time by his late partners and Daniel Benezet, through whom it passed into the hands of Robert Coleman, first upon a lease and afterwards by purchase. In 1742 William Branson, of Philadelphia, erected a forge on Conestoga creek, near the Chester county line, which he called Windsor, and which was afterwards owned by an English company and subsequently by David Jenkins. Until 1813 a large part of Lebanon county, which was formed in that year, was embraced within the limits of Lancaster county.

In Nicholas Scull's map of Pennsylvania (1759) two ironworks are marked at Pottstown, at the mouth of the Manatawny, one on each side of the stream, but their names and their owners' names are not given. We learn, however, from another source, that one of them was a forge named Pottsgrove, the original name of Pottstown, which was laid out in 1752 by John Potts, son of Thomas. Above Pottstown the following ironworks appear on Scull's map in the order named: McCall's forge, Pool forge, and Pine forge, on the Manatawny, and Colebrookdale furnace on the Ironstone branch. The last three enterprises are located in Berks county, but McCall's forge is in Montgomery county. Mayberry's forge and one or two other ironworks east of the Schuylkill are also marked on Scull's map. Pine forge was built before 1747 by Thomas Potts. In 1768 it was owned by his son John. It probably supplanted both the Pool forges. In 1845 it was converted into a rolling-mill, run by water-power, and is still active. Crossing the Schuylkill with Scull, we find Warwick furnace and Redding furnace on French creek, and Windsor forge, in the order named—the first two in Chester county and the last in Lancaster county. Coventry forge is not noted, but it was certainly in operation in 1756, as an official statement made in 1757 shows, and in 1770 it is noted on William Scull's map of Pennsylvania. It was in operation after the Revolution, and in 1856 a forge of the same name, which is now abandoned, was in operation at or near the original site. In Israel Acrelius's *History of New Sweden*, written about 1756, mention is made of a forge attached to Warwick furnace, and of another attached to Redding furnace, one of which was beyond doubt Coventry. The historian says: "Each has his own furnace—Branz at Reading, Nutt at Warwick. Each also has his own forges—Branz in Windsor. Nutt supplies four forges besides his own in Chester county."

The first steel works in Pennsylvania are said by Mrs. James and others to have been erected on French creek, in Chester county, prior to 1734, by Samuel Nutt, but William Branson was probably associated with him in this enterprise, if, indeed, Samuel Nutt assisted to build these works at all. In his will he makes no mention of them. They were known as the Vincent steel works. In 1756 they were owned by William Branson, and are thus described by Acrelius, the Swedish historian: "At French creek, or Branz's works, there is a steel furnace built with a draught-hole, and called an 'air oven.' In this, iron bars are set at the distance of an inch apart. Between them are scattered horn, coal-dust, ashes, etc. The iron bars are thus covered with blisters, and this is called 'blister steel.' It serves as the best steel to put upon edge-tools. These steel works are now said to be out of operation."

In 1750 there was a plating forge with a tilt-hammer in Byberry township, in the northeastern part of Philadelphia county—the only one in the province, owned by John Hall, and two steel furnaces within the city limits, one of which (Paschal's) was built in 1747, and stood on a lot at the northwest corner of Eighth and Walnut streets; the other was owned by William Branson. There appear to have been no other steel furnaces in operation in the province in 1750. Hall is said to have established a bloomary forge on the "Huitleer river" about 1734.

At an early day there were two iron enterprises in that part of Chester county which is now embraced in Delaware county. These were a forge on Crum creek, about two miles above the town of Chester, built by John Crosby and Peter Dicks about 1742, and a rolling and slitting mill on Chester creek, in Thornbury township, where Glen Mills now stand, built in 1746, by John Taylor. The forge on Crum creek was in operation as late as 1756, when Acrelius says it was owned by Peter Dicks, had two stacks, was worked sluggishly, and had "ruined Crosby's family." This last statement is disproved by a local historian. In 1748 Peter Kalm, a Swedish traveler, wrote that the ore for the Crum creek forge was obtained thirty or forty miles away, where it was first melted in an oven, and then carried to the forge. The bellows at this forge were made of leather. Taylor's enterprise was named Sarum ironworks, and embraced a forge or forges as well as a rolling and slitting mill. In September, 1750, John Owen, sheriff of Chester county, certified to the Lieutenant-Governor of Pennsylvania that Sarum had been in operation until June of that year, after which time the British government had interdicted the further employment of rolling and slitting mills in the colonies. We can not learn whether Mr. Taylor long obeyed this decree, but it is said that his works were carried on with energy until his death in 1756. Acrelius, writing about the time of Taylor's death, says: "Sarum belongs to Taylor's heirs; has three stacks, and is in full blast." Peter Kalm states that at Chichester (Marcus Hook) "they build here every year a number of small ships for sale, and from an ironwork which lies higher up in the country they carry iron bars to this place and ship them." This "ironwork" was probably Sarum. Taylor was the descendant of an English settler in the province. His rolling and slitting mill was the first in Pennsylvania.

Valley Forge, in Chester county, has historic associations which no American can ever forget. This forge seems to have been erected some time prior to 1757 by Stephen Evans, whose executors sold it in that year to John Potts. There is a misty tradition, however, that it was built at a much earlier day by a person named Walker, an Englishman, who came over with William Penn. Its original name was Mount Joy, which name is said to have been given to the neighboring mountain by William Penn. This was also the name of a manor owned by him on the Schuylkill. The forge was located near the mouth of East Valley creek, on the Chester side of the creek—the creek forming a part of the boundary between Chester and Montgomery counties. The forge was destroyed by the British in 1777, just prior to Washington's occupation of the vicinity for winter quarters. It was rebuilt after the Revolution, probably by David and Isaac Potts. The iron used at Valley forge was made at Warwick furnace, which continued in operation during a part of almost every year from its erection in 1737 down to 1867, when its last blast came to an end and the furnace was abandoned.

The foregoing information about Valley forge was obtained with much difficulty and from various sources. Since writing the above, however, we have received a yet more circumstantial account of this historic forge, the particulars of which were kindly obtained for us, after much personal investigation, by Joseph E. Thropp, Esq., of West Conshohocken, Montgomery county. It is as follows:

Valley forge was built on the western side of Valley creek, in Chester county. The original site was about five-eighths of a mile from the mouth of the creek. It was owned and operated by members of the Potts family from the spring of 1757 until its destruction by the British about two months before the American army encamped there in 1777. From 1771 Col. William Dewees, son of Sheriff William Dewees of Philadelphia, was associated with the Pottses, and in 1773 appears to have bought an interest. The iron used at this forge was hauled by teams from Warwick furnace. After the close of the war another forge was erected about three-eighths of a mile farther down the stream, on the Montgomery county side, on ground now covered by part of the cotton and woolen factory, and a new dam was built, raising the water partly over the site of the old Mount Joy forge. (This second forge was in ruins in 1816.) About the same time a slitting-mill was erected on the Chester county side, most probably being constructed out of one of the buildings used by the artisans for the army. The forge and slitting-mill were built by Isaac Potts and his brother David. In 1786 they were operated under the firm name of "Isaac Potts & Co.," the company consisting of David (Isaac's brother) and his son James. The property subsequently passed through the hands of Joseph Potts, Ralph Peacock, Rebecca Robbins, and Jacob Vogdes, until in 1814 the latter, who had not operated the works, sold them to John Rogers and Joshua Malin. Malin, who was a cousin of Rogers, was the manager. He rebuilt the rolling and slitting mill, making it about 30 feet wide by 80 feet long. There was a "tilt mill" in one end, and between the main building and the dam a small foundry, the cupola of which was blown by a water blast. He also commenced a three-story stone building on the Montgomery county side, which is still standing, and constitutes part of the present cotton factory. This was intended for the manufacture of hardware. In 1816 Malin became involved, and John Rogers was by suit proven to be his partner and compelled to pay his debts. April 1st of that year Rogers bought Malin's half interest in the property, and in the fall of the year James Wood went there as a partner of John Rogers and manager of the works. Isaac Smedley was also a member of the firm. Wood completed the mill which was intended by Malin for a hardware factory, and made it into a saw factory, principally, though shovels, spades, files, etc., were also made. He also operated the rolling-mill, making boiler plate and sheet and band iron. Part of this was slit for the nail mill at Phœnixville, where as yet they had no such facilities. Malin had made nails by hand in a frame building nearer the road. The iron used by Wood in the rolling-mill was obtained from Laurel forge, Coventry forge, and Springton forge.

About 1818 Rogers sent John Parkins and his son John, Jr., to Wood to see if they could successfully make cast steel, to be used in their saws. These men had during 1812 made an attempt to make cast steel in New York City, but failed. A furnace was built in the back end of the rolling-mill, but did not prove large enough; then a large stack was erected between the rolling-mill and the smith-shop (part of the smith-shop is still standing and used as a stable), and six furnaces were built around it. Here cast steel of good quality for use in saws was made. Sixty barrels of clay for crucibles were brought from Perth Amboy. Early in 1821 Brooke Evans, of Sheffield, England, went to Valley Forge, having leased the property from Rogers. He converted the saw factory and rolling-mill, then being vacated by James Wood, into gun factories. He raised the roof of the rolling-mill and added two stories to it. (He made at Valley Forge 20,000 muskets.) This building was subsequently destroyed by a freshet, and no traces of it remain. The building on the Montgomery county side, after being vacated as a gun factory, was enlarged and converted into a cotton and woolen factory.

Development of the Cornwall Ore Hills.—Cornwall furnace, mentioned before as having been built by Peter Grubb in 1742, was located within the limits of the since celebrated Cornwall ore hills, in Lebanon county, and is now running. It is the oldest furnace in the country which is still in operation. The Cornwall ore hills, which literally comprise a mountain of almost pure magnetic iron ore, were conveyed by John Penn, Thomas Penn, and Richard Penn, who were proprietors-in-chief of the province of Pennsylvania, and counties of Newcastle, Kent, and Sussex on the Delaware, by their warrant dated London, May 8, 1732, to Joseph Turner, of Philadelphia, for five hundred pounds, money of Pennsylvania. The grant embraced 300 acres. Turner assigned the entire tract to William Allen, April 5, 1734, and on the 28th and 29th of November, 1737, Allen assigned the same to Peter Grubb, to whom a patent was issued August 2, 1745. Peter Grubb died intestate about 1754, and the estate descended to Curtis Grubb and Peter Grubb—Curtis receiving two-thirds under the intestate law of that day, and Peter one-third. Both sons were colonels in the Revolution. On June 28, 1783, Curtis conveyed a one-sixth interest to Peter Grubb, Jr., his son. By articles of agreement, dated September 26, 1785, Peter Grubb, Jr., grandson of the first-named Peter Grubb, and son of Curtis Grubb, sold to Robert Coleman his share of the Cornwall ore hills, Cornwall furnace, and appurtenances, reserving the right for a sufficient quantity of ore for one furnace, which right is held and exercised to-day by Ferguson, White & Co., the proprietors of Robesonia furnaces in Berks county. The deed for the share sold to Robert Coleman, signed by Peter Grubb, Jr., and Mary his wife, is dated May 9, 1786. After that year Robert Coleman, through successive purchases from the Grubbs, acquired four additional sixths of the property originally conveyed by the Penns to Joseph Turner. At his death in 1825, his estate was devised to his four sons, and at the present time, under various partitions that have since taken place, the interest of Robert Coleman is vested in his grandsons, Robert and G. Dawson Coleman, and in the heirs of his grandsons, William and Robert W. Coleman while one-sixth still continues as the property of the descendants of Peter Grubb. Neither the Coleman nor the Grubb family limited its operations in the last century to the Cornwall ore hills, but each became the owner of many other iron properties. Both families are now prominently engaged in the manufacture of pig iron—the heirs of William and Robert W. Coleman owning five anthracite furnaces and the old Cornwall charcoal furnace, G. Dawson Coleman owning three furnaces, and the heirs of Peter Grubb owning, in whole or in part, eight furnaces.

During the Revolution, Cornwall furnace cast cannon and shell and shot for the Continental Congress. Colebrook furnace, a near neighbor of Cornwall furnace, is frequently said to have been built in 1745. This statement is an error, traceable doubtless to a confounding of this furnace with Colebrookdale furnace in Berks county. Colebrook furnace was built by Robert Coleman in 1791.

John Grubb, the father of Peter Grubb, 1st, who built Cornwall furnace, was a native of Cornwall, in England, whence he emigrated to this country in 1692, landing at Grubb's Landing, on the Delaware, near Wilmington. He was a member of the Provincial Legislature of Pennsylvania from 1694 to 1698. He is buried in the Swedes' graveyard, at Wilmington. Peter Grubb, his son, was born at Grubb's Landing. We are unable to ascertain the exact time when he embarked in the manufacture of iron in Lancaster county. Hazard intimates that he commenced operations as early as 1728, but we can find no proof that he did. A tradition in his family says that he built a furnace in 1735 about five-eighths of a mile from the site of Cornwall furnace, and cinder is pointed out to sustain the tradition. But this supposed furnace was undoubtedly a bloomary, which may be regarded as Mr. Grubb's first iron enterprise. The earliest record evidence of his connection with ironmaking in Lancaster county is believed to be contained in "y^e leace" of Cornwall ore lands, in 1739, by Peter Grubb to Samuel Grubb and Joseph Taylor. In this lease Peter Grubb is styled an "ironmaster," and it says that he "intends to build an iron furnace" on land adjacent to that leased to Samuel Grubb and Joseph Taylor. That furnace was undoubtedly Cornwall furnace, built in 1742. Hopewell forge was built about the same time by Peter Grubb. Mr. Grubb resided at Hopewell forge. On the same stream Speedwell forge was subsequently built, and was owned by James Old about 1760. These forges were on Hammer creek, within the present limits of Lancaster county. Mount Hope furnace, built by Peter Grubb, Jr., in 1785, and still active, is on the Big Chiquisalunga creek, in Lancaster county, about ten miles south of Lebanon. In Acrelius's history, written about 1756, appears the following statement:

> Cornwall, or Grubb's ironworks, in Lancaster county. The mine is rich and abundant, forty feet deep, commencing two feet under the earth's surface. The ore is somewhat mixed with sulphur and copper. Peter Grubb was its discoverer. Here there is a furnace which makes twenty-four tons of iron a week, and keeps six forges regularly at work—two of his own, two belonging to Germans in the neighborhood, and two in Maryland. The pig iron is carried to the Susquehanna river, thence to Maryland, and finally to England. The bar iron is sold mostly in the country and in the interior towns; the remainder in Philadelphia. It belongs to the heirs of the Grubb estate, but is now rented to Gurrit & Co.

Martic forge, three-fourths of a mile east of the present village of Colemanville, Lancaster county, built in 1755, was one of the two forges "belonging to Germans in the neighborhood." From about 1825 to 1850 steel was made here.

Robert Coleman came from Castle Fin, in Ireland, in 1764, and for two years was engaged as a clerk in the office of Mr. Read, Prothonotary at Reading, Pa. In 1766 he engaged in the manufacture of iron in Lancaster county. He first found employment with Peter Grubb, 2d, at Hopewell forge, as a clerk. In six months he left Mr. Grubb to enter the service of James Old, at Quitapahilla forge, near Lebanon, and thence went with Mr. Old to Reading furnace on French creek. In 1773 he leased Salford forge, near Norristown, for three years. In 1776 he leased Elizabeth furnace, into the management of which he introduced many radical reforms. In a little while he bought this furnace, and then advanced step by step until he became the leading ironmaster in Lancaster county. He married a daughter of James Old. The Olds were natives of Wales. Robert Coleman lived to an extreme old age, dying at Lancaster in 1825. He was born in 1748.

Continued Development of the Iron Industry of Eastern Pennsylvania.—Berks county was a busy iron centre before the Revolution, as it is to-day. We have already mentioned its earliest iron enterprises, and now add some others. David Jones, a Welshman, settled on 1000 acres of land in Caernarvon township in 1735, and soon afterwards became prominent as an ironmaster. He was the ancestor of the Hon. J. Glancy Jones. Charming forge, near Womelsdorf, was erected in 1749, and is still active. Hopewell furnace in the southeastern corner of Berks county, on French creek, was built in 1759 by William Bird, an enterprising Englishman, who is said to have built a forge at Birdsboro in 1740, and who originated other iron enterprises. The furnace is still active. He built Roxborough furnace in Heidelberg township sometime prior to his death, which occurred in 1763. The name of this furnace was afterwards changed to Berkshire. He was succeeded by his son, Mark Bird, who built a rolling and slitting mill and a nail factory at Birdsboro about the time of the Revolution. He also built Spring forge, in Oley township, and Gibraltar forges, in Robeson township. At Trenton, New Jersey, he manufactured wire. He failed in business about 1788. The town of Birdsboro, in Berks county, now the seat of the extensive ironworks of Messrs. E. & G. Brooke, was so named after William Bird. Oley furnace, eleven miles northeast of Reading, was built about 1770, and is still active. Oley forge, on Manatawny creek, was built in 1780, and was in operation as late as 1856. These were Mr. Udree's enterprises. Green Tree forge was built in 1770. Reading furnace, in Heidelberg township, Berks county, was erected in 1793, by George Ege, and was in operation until about 1850. Other old furnaces in Berks county include Joanna, built in 1792, rebuilt in 1847, and still in the active list; Sally Ann, built in 1791 and in operation in 1856; and Mary Ann, built in 1797 and also in operation in 1856. Other old forges were built as follows: the two Rockland forges, six miles southeast of Kutztown, in 1788 and 1790, and the two District forges, in Pike township, in 1797 and 1800. In 1798 there were six furnaces and six forges in Berks county. In 1832 there were eleven furnaces and twenty-one forges.

Maria forge, in Carbon county, was built in 1753, and a blast furnace soon followed it. They stood on Poco creek, a short distance east of Weissport. The forge was abandoned in 1858, and the furnace in 1861.

There was a bloomary forge in York county in 1756, owned by Peter Dicks, of Chester county. Spring forge, in the same county, was built in 1770. Pine Grove furnace, in Cumberland county, was built in the same year by Thornburg and Arthur, and about 1800 it was sold to Michael Ege, Sr. About the year 1770 a furnace was built at Boiling Springs, in this county, forming the nucleus of the Carlisle ironworks, which afterwards, about 1782, included a forge, a rolling and slitting mill, and a steel furnace. Michael Ege, Sr., was the proprietor. These works are still in operation, C. W. & D. V. Ahl being the owners. Many other furnaces and forges were built in Eastern Pennsylvania prior to the Revolution, and also some bloomaries.

After the Revolution and even before its close, the business of making iron in Pennsylvania received a fresh impulse, and was extended into the interior of the State. Bishop states that the first furnace built in Franklin county was Mount Pleasant furnace, in Path valley, erected soon after the peace of 1783 by three brothers, William, Benjamin, and George Chambers. A forge was erected as early as 1783. This forge and furnace were four miles northwest of Loudon, and were destroyed in 1843. Soundwell forge, sixteen miles north of Chambersburg, on Conodogwinet creek, was built in 1790, and was active in 1855. Carrick forge, four miles from Fannettsburg, in Franklin county, was built in 1800, and was in operation in 1856. A furnace of the same name was built in 1828, which is still running. Mont Alto furnace, in the same county, was built in 1807, and is still active. Two forges of the same name, which are yet in operation, were built in 1809 and 1810 about four miles from the furnace. In 1832 Mont Alto rolling-mill was built. Loudon forge and furnace were built about 1790 by Col. James Chambers, and destroyed about 1840. Valley forge, near Loudon, in Franklin county, was built in 1804, and abandoned after 1856. Other old forges in Franklin county were abandoned before 1850. Liberty forge, on Yellow Breeches creek, in Cumberland county, was built in 1790, and is still active. Other forges in Cumberland county were built prior to 1800. Cumberland furnace, ten miles southwest of Carlisle, on Yellow Breeches creek, was built in 1794. Holly furnace, at Papertown, in the same county, is said to have been built in 1795. A forge was in existence here in 1848. Both of these furnaces were built by Michael Ege, Sr. They have long been abandoned. A paper mill now occupies the site of Holly furnace. Two furnaces now abandoned once stood near Shippensburg in this county—Mary Ann, built in 1826, and Augusta, built in 1828. Southampton furnaces, Nos. 1 and 2, and Mary furnace, all near Shippensburg, but in Franklin county, are also abandoned. A large forge near Southampton furnaces was torn down in 1849. Big Pond, built in 1836, at Newville, in Cumberland county, is still on the active list as a charcoal furnace.

Franklin and Cumberland counties were very busy iron centres during the first half of the present century. We have mentioned chiefly their early iron enterprises. One of their later enterprises was Caledonia furnace, in Franklin county, ten miles east of Chambersburg, which was built in 1837, and owned in 1863 by Hon. Thaddeus Stevens, in which year it was burned by the Confederates, under General Lee, when on the march to Gettysburg. In 1840 there were 8 furnaces and 11 forges, bloomaries and rolling-mills in Franklin county, and 6 furnaces and 5 forges and rolling-mills in Cumberland county.

We are indebted to Hon. Frederick Watts, of Carlisle, for the following information concerning the distribution of the iron property of Michael Ege, Sr., who was for nearly fifty years a prominent ironmaster of Cumberland county, owning, as we have shown, Pine Grove furnace, the Carlisle ironworks, Holly furnace, and Cumberland furnace. At his death, in 1815, his son, Peter Ege, owned Pine Grove furnace; another son, Michael Ege, Jr., the Carlisle ironworks; another son, George Ege, Holly furnace; and a daughter, Mrs. Eliza Wilson, Cumberland furnace.

Bishop says that in 1786 there were seventeen furnaces, forges and slitting-mills within thirty-nine miles of the borough of Lancaster. In the next twenty-five years a large number of forges and some furnaces were built in Lancaster and Chester counties; and in both counties, but particularly in Chester county, rolling-mills were established. In 1790 Benjamin Longstreth erected a rolling and slitting mill at Phœnixville, where the foundry now stands, to roll bars into plates and slit them into nail rods. This was the beginning of the present extensive ironworks of the Phœnix Iron Company. Rokeby rolling-mill, on Buck run, four miles south of Coatesville, was built in 1795; and Brandywine rolling-mill, at Coatesville, was built in 1810. The puddle-mill of the latter works, now called Lukens, operated by water-power, occupies the site of the original mill which was the first plate-mill built in the United States, as we are informed by the present proprietors. Mary Ann forge, two miles north of Downingtown, was built in 1785, and Springton forge, five miles north of Mary Ann forge, was built in 1790. Both of these forges are still active. Hibernia forge, on West Brandywine creek, four miles north of Coatesville, was built in 1793, and is still in operation in connection with a small rolling-mill which was added in 1837. Sadsbury forges, on Octorara creek, near Penningtonville, were built in 1800 and 1802, and one is still in operation. Brooke forge, near Pequea, in Lancaster county, was built in 1795, and Pine Grove forge, sixteen miles south of Penningtonville, on Octorara creek, in the same county, was built about 1800. A small rolling-mill, which is now abandoned, was added in 1844 on the Chester county side of the creek. Pleasant Garden forge, on the Brandywine, five miles southeast of Oxford, was built in 1806 and abandoned about 1848. A small rolling-mill was built in 1845, which is also abandoned.

Castle Fin forge, in York county, was built in 1810 by Thomas Bird Coleman, of Cornwall furnace, Lebanon county. It is on Muddy creek, and is still on the active list. Margaretta furnace, on Cabin Branch creek, was erected in 1823, and a forge called Woodstock was erected at the same place in 1828. Both have been abandoned. Codorus forge, on a creek of the same name, was built by Henry B. Grubb, and abandoned before 1850. York furnace, one mile below Colemanville, was built in 1830, and is still active. A furnace at York made all kinds of castings in 1832, when it was owned by Israel Gardner. This county is not now prominent as an iron centre. In 1843 there were two furnaces and four forges within its limits. In 1850 there were five furnaces and three forges. Since 1850 the iron industry in the county has declined.

Franklin rolling-mill at Chester, in Delaware county, was built in 1808. In 1828 there were five rolling and slitting mills in this county, and some manufactories of finished iron products.

The iron industry in the Lehigh valley was confined to a few charcoal furnaces and forges and one rolling-mill until its first anthracite furnace was built in 1840. There was a forge at Easton, before 1778, named Chelsea. In 1808 William Henry, of Nazareth, built a forge in Northampton county, which was started in 1809, making its first bar of iron on the 9th of March. In 1824 Matthew S Henry built a furnace which made its first ton of pig iron on the 10th of May, 1825. Hampton furnace, near Sheimersville, in Lehigh county, was built in 1809. In 1826 Stephen Balliet built a furnace in Lehigh county, near the Blue mountains, called Lehigh. In 1832 there were in Lehigh county a furnace and forge owned by Mr. Balliet, and a furnace and two forges owned by Mr. Heinbaugh—probably Hampton furnace. In Northampton county there were in the same year one furnace and three forges in operation. In 1836 a rolling-mill and wire factory were built at South Easton, in Northampton county, by Stewart & Co. Now, of all the iron districts in the country, the Lehigh valley ranks second only to Pittsburgh in the yearly value of its iron products, while it ranks first in the list of pig iron districts. It has several large rolling-mills and fifty anthracite furnaces. The Bethlehem Iron Company owns six furnaces and one of the most complete iron and steel rolling-mills in the world.

About the year 1778 a bloomary forge was built on Nanticoke creek, near the lower end of Wyoming valley, in Luzerne county, by John and Mason F. Alden. Another bloomary forge was erected in 1789 on Lackawanna river, about two miles above its mouth, by Dr. William Hooker Smith and James Sutton. Still another bloomary forge was erected in 1799 or 1800, on Roaring brook, at Scranton, then called Slocum's Hollow, by two brothers, Ebenezer and Benjamin Slocum. The product of these bloomaries was taken down the Susquehanna river in Durham boats. They all continued in operation until about 1828.

About 1789 there were fourteen furnaces and thirty-four forges in operation in Pennsylvania, according to a list published by Mrs. James. In 1791 the number of furnaces had increased to sixteen, and of forges to thirty-seven.

Most of the bar iron made in the last century in Pennsylvania was hammered at the forges out of blooms made from pig iron. But little was made from blooms produced in the bloomary fire directly from the ore, as was the New England custom. The Pennsylvania furnaces were also employed in making castings, such as stoves, pots, kettles, etc. The stove which Franklin invented was first cast at Warwick furnace about 1742, by his friend, Robert Grace, who carried on the furnace in right of his wife, the widow of Samuel Nutt, Jr. But the first bar iron made in the province, by Thomas Rutter, Samuel Nutt, and others, was made in forges, sometimes called bloomary furnaces, directly from the ore. During the Revolution cannon and cannon-balls were cast at the Pennsylvania furnaces for the Continental army. Sixty cannon were cast at Warwick furnace alone in 1776.

The early Pennsylvania furnaces made from ten to twenty-five tons of pig iron or castings in a week, the highest limit being seldom attained. As all the furnaces were blown by water-power, and as the water failed in the summer season, a fair yield by one furnace in a year was 500 tons of iron. The size of the furnaces seldom exceeded twenty-five feet in height and seven feet in width at the bosh. Warwick and Cornwall furnaces were each over thirty feet high. These and some other furnaces each yielded in the last century as much as 1000 tons of iron annually. The fuel used was exclusively charcoal, and the blast was always cold. Only one tuyere was used. In 1731 pig iron sold at Colebrookdale furnace at about $15 a ton. Castings cost about twice as much as pig iron. The forges made from sixty to one hundred and fifty tons of bar iron in a year, which sold at from $75 to $100 a ton.

The bar iron and castings made in the Schuylkill valley during the last century were taken down the river to Philadelphia in boats, which were poled back to their starting points with great labor.

First Ironworks in the Juniata Valley.—The first blast furnace in the Juniata valley was Bedford furnace, built in 1785 on the site of the present town of Orbisonia, in Huntingdon county, by the Bedford Company, composed of Edward Ridgley, Thomas Cromwell, and George Ashman. It made from eight to ten tons of pig iron a week. Lytle, in his *History of Huntingdon County*, says it was constructed mostly of wood, and was five feet wide at the bosh, and either fifteen or seventeen feet high. A forge was built on the same creek, by the Bedford Company, a short distance from their furnace, about 1785, which supplied the neighborhood with horse-shoe iron, wagon tire, harrow teeth, etc. Large stoves, and other utensils, were cast at Bedford furnace. The entire product of the furnace was converted into castings and bar iron. At the Philadelphia Exhibition was a stove-plate cast at this furnace in 1792. On the 10th of September, 1793, Thomas Cromwell, for the company, advertised in the Pittsburgh *Gazette* castings and bar iron for sale at Bedford furnace. The first American bar iron ever taken to Pittsburgh is said to have been made at Bedford forge. There was then no wagon road to Pittsburgh. "In the forge the pig iron of the furnace was hammered out into bars about six or eight feet long, and these were bent into the shape of the letter U, and turned over the backs of horses and thus transported over the Alleghenies to Pittsburgh." Bar iron and castings from the Juniata valley were also taken down the Juniata river in arks, some of them descending to as low a point as Middletown on the Susquehanna, whence the iron was hauled to Philadelphia. Much of the iron of the Juniata valley was also sent to Baltimore in arks down the Susquehanna river.

Centre furnace, located about nine miles southwest of Bellefonte, in Centre county, was the second furnace erected in the Juniata valley or near its boundaries. It was built in the summer of 1792 by Colonel John Patton and Colonel Samuel Miles, both Revolutionary officers. The first forge in Centre county was Rock forge, on Spring creek, six miles south of Bellefonte, built in 1793 by General Philip Benner, who subsequently originated other iron enterprises in the same county, and became an extensive shipper of Juniata iron. He died in 1833, aged seventy years, long before which time his Rock forge enterprise had expanded into a rolling and slitting mill, nail factory, furnace, etc. The furnace was built in 1816. Benner came from Chester county, where he had made iron at Nutt's forge at Coventry after the Revolution. In 1795 Daniel Turner erected Spring Creek forge, and in 1796 Miles Dunlap & Co. had Harmony forge on Spring creek in operation. Logan furnace, near Bellefonte, was built in 1800 by John Dunlap. Andrew Boggs and John Royer operated this furnace about 1805–6–7, under a lease from John Duncan, the firm name being Boggs & Royer. Tussey furnace, fourteen miles south of Bellefonte, was built about 1805 by William Patton. In 1807 Roland Curtin, a native of Ireland, and father of Governor Andrew G. Curtin, erected a forge on Bald Eagle creek, about four miles from Bellefonte, and in

1817 he built a furnace called Eagle. In 1831 a small rolling-mill was added, for the manufacture of bar iron and nails. About 1820 Hardman Phillips erected at Phillipsburg a forge and screw factory—the latter one of the first of its kind in this country. Cold Stream forge was erected about the same time by John Plumbe, Sr, in Rush township, Centre county.

Barree forge, between the villages of Spruce Creek and Petersburg, in Huntingdon county, and nine miles west of Huntingdon, on the Little Juniata, was built about 1794 by Edward Bartholomew and Greenberry Dorsey, to convert the pig iron of Centre furnace into bar iron. The pig iron was hauled in wagons about thirty miles over rough roads. Huntingdon furnace, in Franklin township, was built in 1796, four miles from the mouth of Spruce creek, on Warrior's Mark run, but the location selected was too far up the stream to secure the requisite power, and after one or two blasts a new stack was built a mile lower down. The furnace was built for Mordecai Massey and Judge John Gloninger, by George Anshutz, who in 1808 became the owner of one-fourth of the property. At the same time George Shoenberger purchased a one-fourth interest. Prior to 1808 Martin Dubbs became part owner, and for a time the furnace was carried on by John Gloninger & Company, Dubbs being the "Co." Massey, who was a land speculator, never seems to have been directly interested in the management of the furnace after its erection, although continuing to own an interest in it and the greater part of the lands upon which it was erected down to 1808, when the sale to George Anshutz and George Shoenberger took place, and Massey retired absolutely. For these details of ownership we are indebted to Milton S. Lytle, Esq., of Huntingdon, who has taken the pains to examine the official records. A forge called Massey was connected with Huntingdon furnace, and was probably built about 1800. It stood on Spruce creek, about one mile and a half east of the furnace. The furnace has been cold since 1870. Tyrone forges, on the Little Juniata, six miles west of Spruce creek, in Blair county, were established by the owners of Huntingdon furnace, the first of the forges in 1804. In 1832 Gordon stated that these forges, Nos. 1 and 2, with a rolling and slitting mill and nail factory attached to them, formed "a very extensive establishment," owned by Messrs. Gloninger, Anshutz & Co. "The mill rolls about 150 tons, 75 of which are cut into nails at the works, 50 tons are slit into rods and sent to the West, and about 25 tons are sold in the adjoining counties."

Juniata forge was built at Petersburg about 1804 by Samuel Fahnestock and George Shoenberger, the latter succeeding to the entire ownership in 1805. Coleraine forges, on Spruce creek, were built in 1805 and 1809, by Samuel Marshall, an Irishman There have been many forges on Spruce creek, none of which are now in operation. Union furnace, in Morris township in Huntingdon county, was built by Edward B. Dorsey and Caleb Evans in 1810 or 1811. Pennsylvania furnace, in the northern part of Huntingdon county, was built by John Lyon, Jacob Haldeman, and William Wallace in 1813. It was for a long time managed by John Anderson. The boundary line between Huntingdon and Centre counties ran through this furnace. About 1818 Reuben Trexler, of Berks county, built a bloomary called Mary Ann, in Trough Creek valley, Huntingdon county, and about 1821 he added a furnace with the same name, but afterwards changed to Paradise. In 1832 John Savage, of Philadelphia, built a forge near Paradise furnace, which Hon. Archibald McAllister informs us was the first forge in this country "that used the big hammer and iron helve on the English plan."

George Shoenberger, the father of Doctor Peter Shoenberger, was born in Lancaster county, and during the closing years of the last century settled on Shaver's creek, in Huntingdon county, as did also his brother Peter. The town of Petersburg was laid out by Peter Shoenberger, the brother of George Shoenberger, and the plan thereof was acknowledged by him on the 21st day of May, 1795, and recorded on the 28th day of the same month. September 27, 1800, Peter sold to his brother George the tract of land of which Petersburg formed a part, and about 1804 George built Juniata forge in connection with Samuel Fahnestock, as we have already stated. Subsequently, as we have shown, he became part owner of Huntingdon furnace. He died in 1814 or 1815. His only son, Doctor Peter Shoenberger, succeeded him in the ownership of his iron investments.

Etna furnace and forge in Huntingdon county, now in Catharine township, Blair county, were built in 1805 by Canan, Stewart & Moore. John Canan was an Irishman from Donegal, but a citizen of Franklin county prior to his emigration to Huntingdon county. The furnace was the first within the limits of the present county of Blair. Cove forge, on the Little Juniata, in Blair county, was built in 1810, by John Royer, who was born in Franklin county in 1779, was a clerk at Chambers's ironworks in that county, and subsequently operated Logan furnace, in Centre county, in company with his brother-in-law, Andrew Boggs. After a checkered experience, including an honorable record as a member of the lower branch of the State Legislature, first from Huntingdon and afterwards from Cambria county, he died at Johnstown in 1850. Allegheny furnace was built in 1811, by Allison & Henderson, and was the second furnace within the limits of Blair county. In 1835 it was purchased by Elias Baker and Roland Diller, of Lancaster county. The next furnace in Blair county was Springfield, built in 1815 by John Royer and his brother Daniel. Springfield furnace and Cove forge are now owned by John Royer, son of Daniel. The next furnace in this county was Rebecca, built in 1817. Rebecca was the first furnace erected by Doctor Peter Shoenberger, who afterwards became the most prominent ironmaster in the State

Other iron enterprises of his in the Juniata valley were numerous and extensive, and their beginning followed closely upon the building of Rebecca furnace. He also owned ironworks in Bedford, Cambria, Indiana, Westmoreland, Lancaster, Mercer, Allegheny, and perhaps some other counties of Pennsylvania, and at Wheeling, in West Virginia. The Doctor was born at Manheim, Lancaster county, in 1781; died at Marietta, Lancaster county, June 18, 1854, aged seventy-three years, and was buried at Laurel Hill cemetery, Philadelphia. His widow is still living at Germantown, at the age of ninety years. He left a number of children, who continued most of his iron enterprises.

A furnace and forge were built at Hopewell, in Bedford county, about the year 1800, by William Lane, of Lancaster county. On Yellow creek, two miles from Hopewell, Mr. Lane built Lemnos forge and slitting mill in 1806. In 1841 Loy & Patterson built Lemnos furnace, on Yellow creek, two miles west of Hopewell, to use charcoal, the firm leasing the lands from Mr. Lane. They blew the furnace for a few years, when the property was sold, Messrs. Karns, Horton & Gates purchasing it. They afterwards sold to John and Thomas King. It has since changed hands several times, and the furnace is now abandoned. Bedford forge, also on Yellow creek, was built by Swope & King in 1812. Elizabeth furnace, now Bloomfield, was built at Woodbury, in Bedford county, in 1827, by King, Swope & Co., Doctor Shoenberger being the company, and owning one-half. In 1845 the furnace was removed to Bloomfield, in Bedford county. Hanover furnace and forge, nine miles below McConnellsburg, in Fulton county, in the "great cove," were built fifty years ago—the forge in 1822 by John Doyle, and the furnace in 1827 by John Irvine. The "Hanover ironworks" were regarded in their day as an extensive enterprise. They were abandoned, with many other iron enterprises in the State, soon after the passage of the tariff act of 1846. In 1840 Bedford county, which then embraced Fulton county and a part of Blair county, contained nine furnaces and two forges. There are now no iron enterprises in Fulton county. There are three modern-built furnaces in Bedford county—one at Hopewell and two at Riddlesburg.

Steel was made at Caledonia, near Bedford, for several years about the beginning of this century. A circumstantial and very interesting account of this enterprise is given in the following extract from a letter addressed to James Park, Jr., of Pittsburgh, by a distinguished citizen of Pennsylvania. The facts given in this extract are now for the first time placed on record.

William McDermett, who was born near Glasgow, Scotland, emigrated to this country at the close of the Revolutionary war, say about 1783–84. He married in England and brought his young wife with him. He possessed a small capital. She was highly educated and accomplished. I have seen some of the jewels, silver plate, and clothing which she brought with her. They would indicate that her family were persons of some consideration. The young couple landed at Philadelphia, and proceeded westward through Pennsylvania. He had, in Scotland, learned the art of making steel by some new process, and believed the ores of Pennsylvania to be favorable to his project. He went as far west as Bedford, attracted possibly by the name of the place, which was well known to his wife in England. Going a short distance nearly south of that town, and about a mile beyond the present Bedford Springs, he seems to have found the location he was in search of, and there commenced his work, having given to it the name of "Caledonia," by which it is yet known to the residents of Bedford. He erected a log dwelling-house, constructed an extensive dam, and put up his machinery in a humble way. In a few years he began to manufacture steel very successfully. It was sent by his teams to the neighboring counties, and articles of merchandise brought back in return. Many of his children, with whom I have conversed, remember handling the small bars of steel, seeing the departure of the teams, and greeting them on their return. This continued for eight or ten years. At about the close of the last century, when the family lived very comfortably and their means were increasing, Mr. McDermett endorsed for one or more of his neighbors who were in trouble. His fate was the common result of such benevolence. The sheriff soon sold the establishment. Much of the farming land now occupied by the proprietors of the Springs belonged to Mr. McDermett, and the patents from the Commonwealth are found in his name. No other person seems to have understood the art which he had thus successfully put into practice. The house in which he lived still stands. The apple orchard which he planted continues to bear some fruit; but his machinery and works were gradually carried away and converted to other uses. A large part of the dam yet remains, but those who annually fish in it for trout know little of the enterprising man who built it. He moved with his family into the village of Bedford, and lived for a few years in the stone house which stands on one of the corners of the public square. When General Washington passed through Pennsylvania he rested at Bedford, and was the guest of Mr. McDermett and his family. Several of the children were in the habit of repeating the pleasant things which the General said to them during his visit. A few years later Mr. McDermett moved to Spruce creek, in Huntingdon county, on which a considerable iron business had sprung up. Here he ended his days. His wife survived him for many years, and her children experienced all the benefits of the liberal education which her acquirements enabled her to impart to them. While she resided on Spruce creek, a young lawyer named David R. Porter came there to learn the business of making iron. He had studied his profession in Lancaster and Harrisburg, but was prevented from practicing it by successive hemorrhages of the lungs. He was soon employed by the Dorseys as the manager of their works, and afterwards for many years exerted a large influence as State Senator of Pennsylvania and as Governor of the Commonwealth. He married one of the daughters of Mr. McDermett. In old age Governor Porter was, perhaps, as well informed in regard to the progress of the iron business in Pennsylvania as any other citizen of the State. He always regarded Mr. McDermett as the chief pioneer in the manufacture of steel, and greatly regretted that he had not, in his lifetime, committed the process to the keeping of some other person.

To the above we are enabled to add some additional particulars concerning both Mr. McDermett and his distinguished son-in-law. After Mr. McDermett's removal to Spruce creek, a forge and steel works, called Claubaugh, were built on the creek by his nephew, Thomas McDermett, at which steel was made by the process that was used at Caledonia. We presume that blister and shear steel were made by this process. These works passed into the hands of Lloyd, Steel & Co. about the time of the death of William McDermett in 1819 or

1820, by whom they were conducted for a few years, when they were permanently abandoned. David R. Porter was first employed for one year as a clerk at Barree forge, and during the following year he was employed as manager. He next entered into partnership with Edward B. Patton in the building of Sligo forge, on Spruce creek, which establishment passed out of their hands in 1819, in which year Mr. Porter was elected to the lower branch of the Legislature from Huntingdon county, from which event his successful political career may be dated. In 1820 he married Josephine McDermett, a lady of rare attainments.

Many other furnaces and forges and a few rolling-mills were built in the upper part of Juniata valley after 1800. In 1832 there were in Huntingdon county, which then embraced Blair, eight furnaces, ten forges, and one slitting and rolling mill in operation. Each of the furnaces yielded from 1200 to 1600 tons of metal annually. In the same year an incomplete list enumerated eight furnaces and as many forges in Centre county. For many years after the beginning of this century, Huntingdon and Centre counties constituted the principal iron-producing district in the country, Pittsburgh and Eastern cities manufacturing the iron which they produced. This prominence in the production of iron was maintained until after 1842, when the tariff of that year and the discovery that iron could be made with anthracite and bituminous coal enabled other districts in the State and country to wrest from these counties their iron sceptre. In 1850 there were in these two counties and in Blair county (formed out of Huntingdon and Bedford in 1846) and in Mifflin county forty-eight furnaces, forty-two forges, and eight rolling-mills, nearly all of which were in Huntingdon and Centre. These two counties have a long and most honorable iron record.

Hope furnace, six miles from Lewistown, and Freedom forge, three miles from the same place, were built in 1810, and were the first iron enterprises started within the present limits of Mifflin county. General James Lewis was one of the proprietors of Hope furnace. Between 1794 and 1800 a forge was built on Licking creek, about a mile and a half west of Mifflintown, by William Sterrett and Thomas Beale. It was in operation but a short time. It was supplied with pig iron from Centre and Huntingdon counties. The site was then in Mifflin county, but is now in Juniata. In 1832 there were three furnaces and one forge in Mifflin county, and in 1850 there were five furnaces and two forges.

The first iron enterprise in Perry county was probably a forge on Cocalamus creek, built in 1807 or 1808 by General James Lewis, and operated by him in connection with Hope furnace. It was abandoned about 1817. It had two fires and two hammers, and was called Mount Vernon. Juniata furnace, three miles from Newport, was built in 1808 by David Watts, Esq., an eminent lawyer of Carlisle. In 1832 it was owned by Captain William Power. A forge called Fio was built on

Sherman's creek, about four miles from Duncannon, in Perry county, in 1829, by Lindley & Speck. A forge was built at Duncannon in 1829 by Stephen Duncan and John D. Mahon. Duncannon rolling-mill was built in 1838 by Fisher, Morgan & Co. Montebello furnace, at Duncannon, was built in 1834; Perry furnace, four miles from Bloomfield, in 1840; Oak Grove, four miles from Landisburg, by Mr. William Hayes and his brother John, in 1830; and Caroline, at Bailysburg, in 1833. These furnaces were built to use charcoal, and all have been abandoned. There are several new anthracite furnaces in this county, but nearly every one of them is now idle.

Elizabeth furnace, near Antestown, in Blair county, is said to have been the first in the country to use gas from the tunnel-head for the production of steam. The furnace was built in 1832, and the gas was first used in 1836. The improvement was patented in 1840, and as late as 1846 the owner of the furnace, Martin Bell, charged other furnaces a royalty for the right to use the gas.

Among the names which have been prominent in the iron manufacture in the Juniata valley, special reference may be made, in addition to Doctor Shoenberger and others who have been mentioned, to Henry S. Spang of Lancaster county, John Lyon of Cumberland county, and Anthony Shorb of Lebanon county.

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Early Ironworks in other Central and Eastern Counties.—In Clearfield, Clinton, and Tioga counties a few furnaces have been built since 1811, when Washington furnace, on Fishing creek, at Lamar, Clinton county, was built. It was in blast in 1875. But nearly every other iron enterprise in these counties has proved to be a financial failure. The furnace at Farrandsville, near the mouth of Lick run, in Clinton county, which was built about 1834 to use coke, sunk, in connection with a nail-mill, foundry and other enterprises, a large sum of money, said to be over half a million dollars, contributed by Boston capitalists, William P. Farrand, of Philadelphia, being their agent. Mill Hall furnace, near the mouth of Fishing creek, in this county, was built in 1831, by George Bressler, in company with Messrs. Harvey, Wilson, and Kinney, to use charcoal. In 1857 it was converted into an anthracite furnace. Sugar Valley furnace, at Logansville, in Clinton county, was built in 1834, and Washington forge, in the same county, in 1837. Lamar furnace, at Salona, in the same county, was built in 1831. Of the enterprises above named, Washington furnace and forge are the only ones that have not been abandoned. In a historical sketch of Clearfield county, in Egle's *History of Pennsylvania*, it is stated that "in 1814 Peter Karthaus, a native of Hamburg, Germany, but afterwards a resident merchant of Baltimore, established a furnace at the mouth of the Little Moshannon, or Mosquito creek, in the lower end of the county." This furnace was operated with partial success for several years. Between 1834 and 1837 it was converted into a coke furnace, but was soon afterwards abandoned. The first furnace in Tioga county was built by G. J. Boyd in 1841, at Blossburg (from which it took its name) to use anthracite. It was soon abandoned.

An early furnace in Lycoming county was built in 1820, four miles from Jersey Shore, and named Pine Creek. In 1832 it was owned by Kirk, Kelton & Co. A forge was added at the same place in 1831. Heshbon forge, furnace, and rolling-mill, on Lycoming creek, five miles above its mouth, were built respectively in 1828, 1838, and 1842. Hepburn forge, on the same creek, twelve miles north of Williamsport, was built in 1830, and Crescent rolling-mill, one mile lower down the stream, was built in 1842. About 1835 Astonville furnace, near Frozen run, was built to use coke, but charcoal was soon substituted. At Ralston a charcoal furnace, rolling-mill, nail factory, etc., were built by the Lycoming Valley Iron Company in 1837. In 1850 there were three furnaces, three forges, and two rolling-mills in this county.

Esther furnace, about three miles south of Catawissa, on East Roaring creek, in Columbia county, was built in 1802 by Michael Bitter & Son, who cast a great many stoves. In 1836 the furnace was rebuilt by Trago & Thomas. Catawissa furnace, on Furnace run, near Mainville, in Columbia county, was built in 1815, and a forge was built at the same place in 1824, on Catawissa creek. In 1832 there were two furnaces and two forges in Catawissa township. In 1837 Briar Creek furnace, two miles from Berwick, in Columbia county, was built. It has not been in blast since 1849, and is abandoned. In 1845 Fincher & Thomas built Penn charcoal furnace, on Catawissa creek, one mile east of Catawissa. All these furnaces have been abandoned, but the forge at Mainville is still active. A charcoal furnace, called Liberty, was built at Mooresburg, in Montour county, in 1838. The first furnace at Danville, in Montour county, was built in 1838 to use charcoal, but was altered to use anthracite the following year, when two other furnaces were built to use the new fuel, followed in 1840 by a fourth, and soon after by others. Danville rolling-mill was built in 1845, Montour in 1845, and Rough-and-Ready in 1847—all at Danville. A furnace and forge were in operation in Shamokin township, Northumberland county, as early as 1830, probably Paxinas. A furnace was built at Shamokin in 1841, to use anthracite. It was followed by Chulasky furnace in 1846, also anthracite. A furnace and forge were built near Hartleytown, in Union county, in 1827, and called Berlin. They were followed by Forest, near Milton, in 1846, and Beaver, near Middleburg, in 1848—both charcoal furnaces. Nescopeck forge, near Berwick, in Luzerne county, was built in 1824, and abandoned about 1854. Shickshinny charcoal furnace was built in 1846. In 1811 Francis McShane established a small cut-nail manufactory in Wilkesbarre, "and used anthracite coal in smelting the iron." The first rolling-mill in this county was Wyoming, at Wilkesbarre, built in 1842, and followed by Lackawanna, at Scranton, in 1844. Wyoming was abandoned about 1850. Luzerne is now one of the most prominent iron counties in the State. It owes most of this prominence to the courage, energy, and business sagacity of three brothers, George W., Selden T., and Joseph H. Scranton. One of the five furnaces of the Lackawanna Iron and Coal Company at Scranton, in the organization of which they were the leading spirits, is the widest in the State—23 feet at the bosh, and another is the highest in the State—80 feet.

A forge was built at Stroudsburg, in Monroe county, in 1829, called Analomink. In 1843 Day styled it a "large forge."

There is some obscurity concerning the early iron enterprises of Dauphin county, arising partly from its connection with Lancaster county down to 1785 and with Lebanon county down to 1813, rendering it difficult to separate the enterprises of Dauphin county from those of the other counties. Iron was doubtless made within its limits as early as 1800, and probably by members of the Grubb family. Henry Fulton established a "nailery" in Dauphin county in 1785, probably at Harrisburg. It is said to have been "only a little remote from a smithy." Lesley describes Mount Vernon furnace, built in 1800, and a forge of the same name, on the Conewago river, "on the borders of Dauphin county." Oakdale forge, at Elizabethville, appears to have been built in 1830. Victoria furnace, on Clark's creek, was built in 1830. Gordon, in his *Gazetteer of Pennsylvania*, says there were three forges and two furnaces in the county in 1832. Emeline furnace, at Dauphin, was built about 1835. The first furnace at Middletown in this county was built in 1833, and a second furnace was built in 1849, both cold-blast charcoal. Manada furnace, at West Hanover, was built in 1837 by E. B. & C. B. Grubb. The first rolling-mill in the county was the old Harrisburg mill, at Harrisburg, built in 1836. Fairview rolling-mill, on the Cumberland side of the Susquehanna, two miles above Harrisburg, was built in 1831. The first anthracite furnace in the county was built at Harrisburg in 1845 by Governor David R. Porter. Hon. Simon Cameron has been prominently identified with the iron interest of this county.

Chestnut Grove furnace at Whitestown, in Adams county, was built in 1830. About 1830 there was a furnace in this county named Maria, owned by Stevens & Paxton (Hon. Thaddeus Stevens).

Schuylkill county has had several forges, mainly at or near Port Clinton, the first of which at that place appears to have been built in 1801. In 1800 Messrs. Reese & Thomas made preparations toward building a furnace and forge where Pottsville now stands. Prior to 1804 a small charcoal furnace was built by them at this place. In 1807 Greenwood furnace and forge were erected at Pottsville by John Pott, the founder of the town, which was laid out in 1816. In 1832 Gordon gave the iron-works then in operation in Schuylkill county as follows: Greenwood furnace and forge, and Schuylkill, Brunswick, Pine Grove, Mahanoy, and Swatara forges. A furnace called Swatara, six miles from Pine Grove, was built in 1830, which was followed by Stanhope furnace, still nearer to Pine Grove, in 1835. Other iron enterprises have since been established in this county.

First Ironworks West of the Alleghenies.—The first iron manufactured west of the Allegheny mountains was made in Fayette county, Pennsylvania. F. H. Oliphant, of Uniontown, awards to John Hayden, of Fayette county, the honor of having made "the first iron in a smith's fire" as early as 1790. Taking a sample on horseback to Philadelphia, he enlisted John Nicholson of that city in a scheme for building Fairfield furnace, seven miles south of Uniontown, on George's creek, and the two "then went on to build the furnace." Mr. Oliphant thinks this was the first furnace, the date of the erection of which he fixes at "about 1790," but Bishop says that the first furnace "was built by Turnbull & Marmie, of Philadelphia, on Jacob's creek, between Fayette and Westmoreland counties, fifteen miles above its entrance into the Youghiogheny river. It was first blown in November 1, 1790, and produced a superior quality of metal both for castings and bar iron, some of it having been tried the same day in a forge which the proprietors had erected at the place." The date given here is correct, but the location given to the furnace is erroneous. Craig, in his *History of Pittsburgh* (1851), gives currency to the error in locating this furnace. It was built two and a half miles above the mouth of Jacob's creek, on the Fayette bank, and called the Alliance ironworks. The stack is still standing, but in ruins. The furnace was successfully operated for many years. John Holkar, the French naval agent at Philadelphia, was a silent partner with Turnbull & Marmie. The firm was dissolved August 22, 1793, Peter Marmie taking the works on Jacob's creek, and William Turnbull retiring. Craig gives an extract from a letter by Major Craig, Deputy Q. M. General and Military Storekeeper at Fort Pitt, to General Knox, dated January 12, 1792, as follows:—"As there is no six-pound shot here, I have taken the liberty to engage four hundred at Turnbull & Marmie's furnace, which is now in blast."

Mr. Oliphant says: "I find by my father's books that he and his brother Andrew (John and Andrew Oliphant) bought a half interest in Fairfield in 1795, the parties carrying it on six months alternately for a few years. It then fell into the hands of J. & A. Oliphant." This proves that the furnace was built before 1795. Hon. James Veech says that it was built in 1792.

On the 29th of March, 1871, Mr. Veech published in the Pittsburgh *Commercial* a communication concerning early ironmaking in Fayette county from which we quote the following notice of the pioneer, John Hayden:

In the spring of 1789 John Hayden, who had lived in the red-ore iron region of

New Jersey, hauled over the mountains, from Hagerstown to Brownsville, Fayette county, a four-horse wagon load of goods for Jacob Bowman, who had come from the former to the latter place in 1787, at which he was a prominent merchant and citizen for half a century. Hayden was nearly a month in making the trip—hauling 2,100 pounds at $3 per hundred. Pleased with the beautiful valley at the western base of the Laurel Hill mountain—the last of the chain south of the Youghiogheny, and tired of teaming, he resolved to settle in "the West," and at once removed to near Uniontown. He soon bought out a settler near to where is now "Fairchance (Oliphant's) ironworks," and fixed his abode upon it in the spring of 1790. On the land was a log dwelling, not yet chunked and daubed; and, as winter approached, Hayden betook himself to stopping the interstices. For this he must needs have mortar, which, he thought, could not be well made without lime or calcined oyster or clam shells. As the latter could not be had, he looked around for limestone. In gathering what he supposed were limestones from the bed of a stream, he gathered—unwittingly—"blue lump" iron ore, so unlike the Jersey ores that he never suspected the cheat. He made up a pile of it to burn, with wood; and, after supposing it well burnt, plunged lump after lump of it into water and found it wouldn't *slick,* and that it was as heavy as when he took it from the run. Coming to the conjecture that it was some new form—or color—of iron ore, he resolved to test it. The expedient was an improvised furnace upon a blacksmith's hearth; but none of the smiths in the neighborhood would entertain the experiment. Having a Jersey acquaintance, a smith, in the vicinity of Connellsville, he had resort to him. He had faith enough in the blue lumps to allow the experiment on his hearth. After long and repeated efforts at heating and hammering, the result was a piece of iron, as Hayden used to say, "about as big as a harrow-tooth." Elated with his discovery, Hayden put his "harrow-tooth" and some of the ore in his saddle-bags and rode off to New Jersey, to enlist some of his iron acquaintances in the project of building a furnace and forge in Fayette. None of them would join him in the enterprise. He came back to Philadelphia, where, after his discovery became known, he succeeded in securing the favor of the celebrated John Nicholson, then State Comptroller, and in the zenith of his fame and speculations, which were ultimately so disastrous to himself and the finances of the Commonwealth. Nicholson soon after joined him, and thereupon "took up" large tracts of land in and near the base of Laurel Hill, embracing the territory of Hayden's "blue lump" discoveries. Hayden, about 1792, with the aid of Nicholson, built a little furnace called Fairfield, near to where is now Fairchance; but his patron went down and John Hayden followed; and in a few years the father of F. H. Oliphant succeeded to his furnace and possessions. It may be set down as certain that John Hayden, in 1790, made the first iron west of the mountains. But his furnace was not in operation until after others, profiting by his discovery, had built furnaces and begun the manufacture of *castings.*

Union furnace, now Dunbar furnace, was built by Colonel Isaac Meason, on Dunbar creek, four miles south of Connellsville, in 1791. The tradition is preserved that Union furnace was put in blast in March, 1791. We have already stated that Turnbull & Marmie's furnace was put in blast in November, 1790. Union furnace was succeeded in 1793 by another and a larger furnace of the same name, built near the same site by Colonel Meason and Moses Dillon. Another early furnace was Fairchance, six miles south of Uniontown, on George's creek, built by John Hayden, William Squire, and Thomas Wynn in 1794. J. & A. Oliphant bought it in a dilapidated condition about 1805. It was rebuilt two or three times, and kept in operation until 1873. A forge was built near the furnace about 1794. Another of Colonel Meason's enterprises was Mount Vernon furnace, on Mountz's creek. eight miles east of its mouth, built before July, 1800, as appears from an old advertisement. In 1801 it was rebuilt, as appears from an inscription which is yet preserved. The stack was built of large blocks of sandstone, and is still standing. It is thirty-three feet high and eight feet wide at the bosh. The furnace was last operated in 1824. Laurel furnace, on Laurel run, near Union furnace, was built by Mockbee & Wurtz before 1800, and subsequently rebuilt by James Paull on another site. The firm named also built Hampton forge, to work up the pig metal of Laurel furnace. In May, 1800, John Ferrel, manager, advertised for sale castings "neat, light, and tough," at $100 a ton; also bar iron. He expected soon to have "some rolled iron, nail rods, and cut nails," the latter at eight cents a pound. Redstone furnace, three miles east of Uniontown, was built in 1800. Joseph Huston was one of its first owners, and was followed by his nephew, Judge John Huston, and afterwards by John Snyder. A forge on the head waters of George's creek was owned by Thomas Lewis and Philip Jenkins in 1800, when it was advertised for sale by the sheriff. Spring Hill furnace was built in 1805 by Robert Jones, and afterwards fell into the hands of Jesse Evans. Mary Ann furnace, nine miles from Uniontown, was built by Richard Lewis in 1800, and in 1818 was bought by the present owner, Joseph Victor, who lived on the premises in 1876. He rebuilt or repaired the furnace and changed its name to Fairview.

Other furnaces were built in Fayette county early in the present century, among them the following: Pine Grove, eleven miles from Uniontown, built about 1805, and owned in 1857 by Basil Brownfield; Mount Etna, one and a half miles above Connellsville; Centre, nine miles from Uniontown, on Dunbar creek; Fayette, twelve miles from Connellsville; Little Falls, twelve miles from Uniontown, by Nathaniel Gibson; St. John's, built by James Paull, eight miles from Connellsville. There was a forge at Little Falls as early as 1809. Breakneck or Findley furnace was built about 1826, four miles northeast of Connellsville. In 1811 there were in Fayette county ten blast furnaces, one air furnace, eight forges, three rolling and slitting mills, one steel furnace, and five trip-hammers. The steel furnace was owned by Morris Truman & Co., at Bridgeport, adjoining Brownsville, and made good steel. In 1816 Colonel Isaac Meason built a mill for puddling iron and rolling bars at Plumsock, in this county, of which we shall speak hereafter.

It will be seen that Fayette county was a great iron centre at the close of the last and the beginning of the present century. For many years Pittsburgh and the Ohio and Mississippi valleys were almost entirely supplied by it with castings of all kinds, and with pig and bar iron. Long before 1850, however, the fires in most of its furnaces and forges died out. In 1849 only four of its furnaces made iron. In 1876 the county contained five furnaces and one rolling-mill.

A furnace named Mary Ann was erected at a very early day about twenty miles from Uniontown, in Greene county, on the opposite side of Ten-Mile creek from Clarksville. It was abandoned long before 1820. Hon. James Veech writes us that he remembers the ruins of it well. The stack was visible for some time after 1840. He has an advertisement by "Samuel Harper, agent for the proprietors," dated July 23, 1810, for its sale, naming it as "The Iron Works," late the property of Captain James Robinson. It was probably built about 1800. Gordon, in his *Gazetteer*, (1832,) says that "there were formerly in operation on Ten-Mile creek a forge and furnace, but they have been long idle and are falling to decay." Day, in his *Historical Collections*, (1843,) says "a forge and furnace were formerly in operation near the mouth of Ten-Mile creek, but were suffered to decline." These references are clearly to Robinson's works. We think that Greene county has never had any other iron enterprise within its limits.

From 1790 to 1800 it is stated that twenty-one furnaces were built in Pennsylvania. One of these was located within about three miles of Pittsburgh, near the present suburb of Shady Side. It was soon abandoned. We shall refer to it farther on. The first nail factory west of the Alleghenies was built at Brownsville, before 1800, by Jacob Bowman, at which wrought nails, made by hand, were produced. The manufacture of nails by machinery was perfected about the close of the century.

Description of the Primitive Methods of Manufacturing Wrought Iron.—From a letter received by us from Mr. Oliphant we quote an interesting description of the early method of manufacturing wrought iron in Western Pennsylvania. It is the same that was in use at an earlier day in other sections of the State.

> The first wrought iron made west of the Alleghenies was by blooming the ore from the Fairfield mines, blue lump, by Mr. John Hayden, one of the proprietors of Fairfield furnace. The process was to burn the ore and then pulverize it by stamping very fine. Then it was placed in an open fire, 18 inches square by 15 inches deep, formed of stone, having a tuyere 5 inches below the top, one inch in diameter, supplied by blast from tubs, and water-wheel to drive the tubs, making a half pound to the inch: fuel, charcoal. Work commenced by filling the open fire with charcoal; when lighted up fully applying the blast in the tuyere; then applying the pulverized ore with a shovel by putting it on slowly above the blast, and as it melted the iron ran down below the blast, the cinder being drawn off, and when the space below the blast was filled up to the tuyere, being in a solid mass, it was raised out by a bar 100 lbs. in weight, and taken to a hammer weighing 500 lbs., driven by a water-wheel at the rate of from fifty to two hundred strokes per minute. The chunk was hammered into a bloom; then one end was heated in the same fire to a welding heat, and drawn into what was called an anchony. When some twenty or thirty of these were made, they then enlarged the fire to 20 inches square and 20 inches deep, and heated the bloom or large end, and drew it out

under the hammer into bars of various lengths, from five to ten feet long, and various widths and thicknesses, ready for market.

When the furnaces were got under way, and pig metal was being made, old-fashioned Dutch fires were made to work the pig metal into anchonies, and draw it out into bars. Some ten or twelve of these forges were built up through the county by the persons owning the furnaces, J. & A. Oliphant putting up the first two on George's creek, six miles below the furnaces, and called Sylvan forges. These forges were all built alike, four fires each, three for making the anchonies and one a chaffery to draw them out into bars.

All the furnaces and forges dropped off one by one until all were stopped in the county, except Fairchance and Redstone, the latter going occasionally from 1832 up to 1856. Fairchance, building a rolling-mill in 1834, supplied this whole section with iron, nails, etc., for twenty years, the only ironworks in constant operation. Fairchance built the rolling-mill, making all the machinery castings out of the furnace iron, even the large fly-wheels. The steam cylinder and blast cylinder were brought from abroad.

The First Rolling Mills West of the Alleghenies.—Doubtless rolling and slitting mills, for the manufacture of nail rods principally, were established west of the Alleghenies soon after the first furnace and forge were built in 1790, but specific information concerning the earliest ventures of this kind is wanting. Cramer's *Pittsburgh Almanac* for 1812 says that in 1811 there were three such mills in Fayette county. The first rolling-mill of any kind west of the Allegheny mountains of which we can obtain exact information is described in the *Almanac* for 1813, issued in 1812, as follows: "Jackson & Updegraff, on Cheat river, have in operation a furnace, forge, rolling and slitting mill, and nail factory—nails handsome, iron tough." Like all the rolling and slitting mills of that day and of many preceding days, the Cheat river mill neither puddled iron nor rolled bar iron, but rolled only sheet iron and nail plates with plain rolls from blooms heated in a hollow fire and hammered under a tilt-hammer. The nail plates were slit into nail rods by a series of revolving disks. In reference to the Cheat river enterprise, Mr. Veech writes us that its location was in West Virginia, on the road from Uniontown to Morgantown, about three miles south of the Pennsylvania State line, and eight miles north of Morgantown.

The honor of having erected the first rolling-mill at Pittsburgh is undoubtedly due to Christopher Cowan, an Englishman, who built a mill there in 1812. But this mill had no puddling furnaces, nor was it built to roll bar iron. It was intended to and certainly did manufacture sheet iron, nail and spike rods, shovels, spades, etc. The same number of the *Pittsburgh Almanac* from which we have last quoted says of this enterprise: "Christopher Cowan is erecting a powerful steam-engine, 70 horse-power, to run a rolling-mill, slitting-mill, and tilt hammer; to make iron, nails, sheet iron, spike and nail rods, shovels and tongs, spades, scythes, sickles, hoes, axes, frying pans, cutting knives, chains, plough irons, hatchets, claw hammers, chizzels, augurs, spinning-wheel irons, and smiths' vises—capital $100,000."

The first rolling-mill erected west of the Alleghenies to puddle iron and roll iron bars was built in 1816 and 1817 on Redstone creek, about midway between Connellsville and Brownsville, at a place called Middletown, better known as Plumsock, in Fayette county. The enterprise was undertaken by Colonel Isaac Meason, of Union furnace, who had forges at Plumsock. Mr. Thomas C. Lewis was chief engineer in the erection of the mill, and George Lewis, his brother, was turner and roller. They were Welshmen. The project was conceived by Mr. Thomas C. Lewis, and by him presented to Colonel Meason. This mill was much more complete than Cowan's. Mr. Oliphant tells us that it was built "for making bars of all sizes and hoops for cutting into nails." He says further that "the iron was refined by blast, and then puddled. It was kept in operation up to 1824, the latter part of the time by Mr. Palmer." A flood in the Redstone caused the partial destruction of the mill, the machinery of which was subsequently taken to Brownsville.

In an interview with Mr. Samuel C. Lewis, of Pittsburgh, the son of Thomas C. Lewis, he informed us that his father and his uncle George Lewis not only superintended the erection and put in operation the mill for which these honors are claimed, but that he himself as a boy assisted in rolling the first bar of iron, his uncle being the chief roller. In addition to Thomas C. and George Lewis, two other brothers participated in the work of starting the mill and in the rolling of the first bar—Samuel Lewis, heater, and James Lewis, catcher. At the same time Henry W. Lewis, another brother, was a clerk in the office. Samuel C. Lewis, our informant, was a boy of fifteen years, and "heaved up" behind the rolls. The mill contained two puddling furnaces, one refinery, one heating furnace, and one tilt-hammer. Raw coal was used in the puddling and heating furnaces, and coke in the refinery. James Pratt worked the refinery, and David Adams was the puddler. The mill went into operation in September, 1817. Mr. Lewis told us that his father and uncle, being skilled workmen, and therefore prohibited by an English statute from leaving their native land, were compelled to smuggle their passage across the Atlantic. He further informed us that his father, before going to Plumsock, unsuccessfully endeavored to induce Eastern ironmasters to introduce puddling furnaces and rolls for bar iron.

Was Plumsock the First Mill to Roll Bars and Puddle Pig Iron?—We think it extremely probable that at this mill was done the first puddling and that here was rolled the first bar iron in America. Careful inquiry in well-informed quarters fails to discover the existence in the United States of any rolling-mill to roll bar iron and puddle pig iron prior to the enterprise at Plumsock in 1816. Ralph Crooker, of the Bay State ironworks, at Boston, the oldest rolling-mill superintendent in the United States, writes us that the first bar iron rolled in New England was rolled at the Boston ironworks, on the Mill Dam in Boston, in 1825, and that the first puddling done in New England was at Boston, on the Mill Dam, by Lyman Ralston & Co., in 1835. We can not learn of any mill in Eastern Pennsylvania that either puddled iron or rolled bars as early as 1816.

We have, however, obtained the curious information that a patent was granted to Clemens Rentgen, of Kimberton, Chester county, Pa., as late as June 27, 1810, for a machine to roll iron in round shapes, proving that Cort's rolls had not then been introduced into the United States. Mr. Rentgen was a native of the Palatinate, (now Bavaria,) in Germany, and emigrated from the town of Zweibrücken in 1791 to Kimberton, about six miles from Phœnixville, where he purchased a forge on French creek. At Knauertown he built steel works, at which he undertook to manufacture steel. The steel works were, however, not successful. His forge was continued, and to it he added a small rolling-mill His various enterprises were known as the "Pikeland works," Pikeland being the name of the township in which they were situated. On the 17th day of November, 1796, he obtained a patent for "forging bolts or round iron," which he described as follows:

> This machine consists of a strong platform, of a given size, in which are fixed two upright posts. In these posts is fixed an axle going through the handle of a concave hammer or sledge, at the extreme end of which is fixed a cogwheel, whose cogs, operating on the lever or handle of the said concave hammer or sledge, cause it to operate upon a concave anvil upon which the iron to be wrought is placed. The concavity of this anvil is about one-eighth of the dimensions of that of the said hammer or sledge. This machine is set in motion by water or any other adequate power, by wheels operating upon the said cogwheel.

On the 27th day of June, 1810, Mr. Rentgen obtained a patent, noticed above, for "rolling iron round, for ship bolts and other uses," which he thus described:

> This machine consists of two large iron rollers, fixed in a strong frame. Each roller has concavities turned in them, meeting each other to form perfect round holes, of from half inch to one and three-quarter inches or any other size in diameter, through which rollers the iron is drawn from the mouth of the furnace with great dispatch, and the iron is then manufactured better and more even than it is possible to forge it out. The force applied to the end of these rollers is like that applied to mills.

The original patents of Mr. Rentgen have been shown to us by his descendant, Professor William H. Wahl, of Philadelphia. We learn from this gentleman that Mr. Rentgen made some use of his patent anvil and hammer, and that, before obtaining his patent in 1810 for his method of rolling round iron, he built an experimental set of rolls, which were replaced, after the patent was granted, by a permanent set, with which he rolled round iron as early as 1812 or 1813, some of which was for the Navy Department of the United States Government. We do not learn that he ever rolled bar iron, and it is not claimed that he used puddling furnaces.

It is a curious fact, which may not be known to many of the present generation of American ironmasters, that pig iron has been puddled in this country with wood, as it is now at some places in Sweden; and by the term wood we do not mean charcoal. Prior to 1850 puddling with wood was done at Horatio Ames's works, at Falls Village, in Connecticut; and the Katahdin ironworks, in Maine, puddled with wood in that year. From 1821 to 1825 the Fall River rolling-mill, in Massachusetts, used wood in heating iron for nail plates in reverberatory furnaces.

Beginning of the Iron Industry at Pittsburgh.—The iron industry of Pittsburgh, the most important iron centre in the country, did not have an existence in the last century, although a blast furnace was built within a few miles of the town before its close, as already stated. As the site of this blast furnace is now embraced within the city limits, we give place here to a full account of it and of its founder, which we have derived from trustworthy original sources.

George Anshutz, the pioneer in the manufacture of iron at Pittsburgh, was an Alsacian by birth, Alsace at the time being under the control of France He was born November 28, 1753 He acquired some knowledge of the iron business by having the management of a foundry in the vicinity of Strasburg. In 1789 he emigrated to the United States, and soon afterwards located at a place now known as Shady Side where he built a small furnace, probably completing it in 1792. In 1794 the furnace was abandoned. It had been expected that ore could be obtained in the vicinity, but the expectation was not realized. The neighborhood produced little else than red shale. Recourse was next had to a deposit of iron ore on Roaring run, an affluent of the Kiskiminetas, in the southeastern corner of Armstrong county, from which supplies were received in arks at a point on the Allegheny near to the furnace. Some ore was also brought by difficult wagon transportation from the vicinity of Fort Ligonier and Laughlinstown, in Westmoreland county. But the expense entailed in bringing ore from localities so difficult of access in those days was too great to justify the continued working of the furnace. After its abandonment Anshutz accepted the management of John Probst's Westmoreland furnace, near Laughlinstown, and continued there about one year, whence he removed to Huntingdon county, where, in connection with Judge John Gloninger and Mordecai Massey, he built Huntingdon furnace in 1796. Massey owned the land, Gloninger furnished the money, and Anshutz supplied the necessary experience and skill, with an understanding, we believe, that he was subsequently to become a partner. In 1808 he became the owner of one-fourth interest in the furnace. At this furnace most of the remaining years of his long and useful and prosperous life were spent. When about eighty years of age he retired from active business, and with his family removed to the scene of his early trials, Pittsburgh, about 1833. Here he died, February 28, 1837, at the age of eighty-three, in a house that had been built under his own directions, on the bank of the Monongahela river. He was buried in the old German burying-ground in Pittsburgh, but his remains were some years afterwards removed to Allegheny cemetery. He left a large number of descendants, who rank among the first citizens of Pittsburgh.

Anshutz's furnace at Pittsburgh was built at a point about four miles east of the site of Fort Pitt, and midway between the Allegheny and Monongahela rivers, on a stream known then and now as Two-Mile run, on the bank of which Colonel Jonas Roup had previously at an early period, after emigrating from the Cumberland valley, erected a grist and saw mill. In 1794 the fire of the furnace lighted up the camp of the participants in the whisky insurrection. There was no forge connected with the furnace. The enterprise seems to have been largely devoted to the casting of stoves and grates, which, with the coal from the surrounding hills, gave comfort and cheer to the people of the neighborhood. The ruins of the furnace disappeared about 1850 from the spot that had long known them, within the eastern line of the Roup farm, and now within the enclosure of William O'Hara Scully, at Shady Side. When the track of the Pennsylvania Railroad was graded at Shady Side, in 1851, a portion of the furnace building was demolished and a part of its foundation was removed. Subsequently, in digging the cellar of Alexander Pitcairn's house, a portion of the cinder bank was exposed.

Second Stage in the Development of the Iron Industry at Pittsburgh.—The first iron foundry at Pittsburgh was established in 1803 by Joseph McClurg, on the site of the present post office and the city hall. In 1812 it was converted by him into a cannon foundry, In 1807 there were three nail factories in existence in Pittsburgh—Porter's, Sturgeon's, and Stewart's, according to Cramer's *Almanac*—one of which made 100 tons of cut and hammered nails annually. In 1810 about 200 tons of cut and wrought nails were made at Pittsburgh. The first steamboat on the Ohio river, the *New Orleans*, was built at Pittsburgh in 1811. In 1813 there were two foundries in Pittsburgh, McClurg's and Anthony Beelen's; one steel furnace, owned by Tuper & McKowan; and one rolling-mill, owned by Christopher Cowan. Cowan's rolling-mill was known as the Pittsburgh rolling-mill. The first "patent" nail machine introduced into Pittsburgh is said to have been used in this rolling-mill in 1814. The second rolling-mill in Pittsburgh was the Union, on the Monongahela river, built in 1819, and accidentally blown up and permanently dismantled in 1829, the machinery being taken to Covington, Kentucky. This mill had four puddling furnaces, the first in Pittsburgh. It was also the first mill in Pittsburgh to roll bar iron.

The following rolling-mills were in operation at Pittsburgh in 1826: Sligo mill was erected where it now stands by Robert T. Stewart and John Lyon in 1825, but was partly burned down that year. The Juniata ironworks were owned by Dr. Peter Shoenberger, and were erected in 1824. Grant's Hill works were erected in 1821 by William B. Hays and David Adams. They stood near where the court-house now stands. Water for the generation of steam had to be hauled from the Monongahela river. The Union rolling-mill, located east of Kensington, (Pipetown,) was the largest and most extensive of the kind in the Western country. It was built in 1819, and owned by Messrs. Baldwin, Robinson, McNickle & Beltzhoover. The Dowlais works, in Kensington, were built by George Lewis and Reuben Leonard in 1825. At Penn street and Cecil's alley, where the Fourth Ward schoolhouse now stands, stood the Pittsburgh rolling-mill, built in 1812, and in 1826 owned by R. Bowen. On Pine creek was the mill of M. B. Belknap, operated by both steam and water power. In 1817 this mill was a scythe and sickle factory. All of these mills did not make bar iron in 1826: some only manipulated rolled and hammered iron. In 1825 there were "eight air foundries and a cupola furnace" in Pittsburgh. Pig metal for the supply of these foundries and the rolling-mills was in part obtained from blast furnaces in the neighboring counties, but much of it was brought from the Juniata valley, which also supplied the mills with most of their blooms. The Juniata pig iron and blooms were hauled over the Allegheny mountains to Johnstown, usually on sleds in the winter season, and taken down the Conemaugh, Kiskiminetas, and Allegheny rivers to Pittsburgh with the spring and fall freshets.

In 1829 Pittsburgh had eight rolling-mills, using 6,000 tons of blooms, chiefly from the Juniata valley, and 1,500 tons of pig metal. In the same year there were nine foundries that consumed 3,500 tons of metal. In 1828 the iron rolled was 3,291 tons; in 1829 it was 6,217 tons; and in 1830 it was 9,282 tons. It is stated that in 1830 one hundred steam-engines were built. In 1831 there were two steel "furnaces," and cast iron began to be used for pillars, the caps and sills of windows, etc. In 1836 there were nine rolling-mills in operation, and eighteen foundries, engine-factories, and machine-shops. In 1856 there were in Pittsburgh and Allegheny county twenty-five rolling-mills and thirty-three foundries.

There were no blast furnaces in Pittsburgh and Allegheny county in 1858, but now there are twelve. Clinton furnace, built in 1859, by Graff, Bennett & Co., and blown in on the last Monday of October in that year, was the first furnace to be built in Allegheny county after the abandonment in 1794 of George Anshutz's furnace at Shady Side—a surprisingly long interregnum. Clinton furnace was followed in 1861 by the two Eliza furnaces of Laughlin & Co., and soon afterwards by others. The Lucy and Isabella furnaces have yielded larger weekly products of iron than any other furnaces in the country. The ores used at Pittsburgh are mainly obtained from the Lake Superior mines, but those of Missouri also furnish a large proportion.

There were thirty-two rolling-mills in Pittsburgh and Allegheny county in 1876, four of which made steel as well as iron. There were nine other establishments which made only steel. The Edgar Thomson Bessemer steel works, completed in 1875, occupy the site of Braddock's Field The most surprising fact connected with the iron industry of Pittsburgh is that it all should have had its growth since the beginning of the present century.

Beginning of the Iron Industry in Other Western Counties.—Westmoreland furnace, near Laughlinstown, in Ligonier valley, Westmoreland county, on Four-Mile run, a branch of Loyalhanna creek, was built by John Probst about 1792, who also built a small forge about the same time Neither the furnace nor the forge was long in operation, both probably ceasing to make iron about 1810. Colonel John McFarland, of Ligonier, informs us that he has used iron made at these works. On the 1st of August, 1795, George Anshutz, manager of Westmoreland furnace, advertised stoves and castings for sale. General Arthur St. Clair built Hermitage furnace, on Mill creek, two miles northeast of Ligonier, on the road to Johnstown, about 1802. It was managed for its owner by James Hamilton. The following advertisement appeared in the *Farmer's Register*, printed at Greensburg, Pa., November 21, 1806, by John M. Snowden. This advertisement had for its caption, "Hermitage Furnace in Blast," and was signed by Henry Weaver & Son, and dated at "Greensburg, September 12, 1806." It read as follows:

> The subscribers, being appointed agents by Gen. A. St. Clair, for the sale of his castings generally, and for the Borough of Greensburg exclusively, give notice that they will contract with any person or persons for the delivery of castings and stoves, for any number of tons, on good terms. Samples of the castings and stoves to be seen at their store, in Greensburg, any time after the 20th instant.

In 1810 Hermitage furnace passed out of the hands of General St. Clair, and stood idle for some time. In 1816 it was started again by O'Hara & Scully, under the management of John Henry Hopkins, afterwards Bishop of Vermont. In October, 1817, Mr. Hopkins left the furnace, himself a bankrupt, and it has never since been in operation. The stack is yet standing, and a large sycamore tree has grown out of the stone wall, about ten feet above the ground. General St. Clair died a poor man in 1818, aged eighty-four years, and is buried at Greensburg. Mount Hope furnace was built about 1810, in Donegal township, Westmoreland county, by Trevor & McClurg. Washington furnace, near Laughlinstown, in this county, was built about 1809, by Johnston, McClurg & Co. It was in blast as late as 1854, and in 1859 was owned by L. C. Hall. It was abandoned in 1826, and rebuilt in 1848 by John Bell & Co. Jonathan Mayberry & Co. owned Fountain furnace, in Westmoreland county, before 1812, but where this furnace was located we have been unable to learn. The firm was dissolved August 19, 1812. Kingston forge, erected in 1811 on Loyalhanna creek, Westmoreland county, ten miles east of Greensburg, by A. Johnston & Co., went into operation early in 1812. Ross furnace, in Fairfield township, Westmoreland county, was built on Tub Mill creek, in 1815, by James Paull, Jr., Col. J. D Mathiot, and Isaac Meason, Jr., and abandoned about 1850. It made pig iron, stoves, sugar-kettles, pots, ovens, skillets, etc. Another furnace in Fairfield township was built a short distance below Ross furnace, on Tub Mill creek, by John Beninger, about 1809. He also built a small forge on the same stream. The name of the furnace is not preserved. Where the borough of Bolivar now stands there once stood a forge which may have been Beninger's, but definite information is lacking. Both the furnace and forge ceased to make iron soon after they were built. In 1834 a manufactory of axes and sickles was established at Covodesville, on Tub Mill creek, above Bolivar, by Uri Updegraff. The business was continued for eight years by Mr. Updegraff. Baldwin furnace, on Laurel run, near Ross furnace, is said to have been built by James Stewart about 1810. It ran but a short time. It was named after Henry Baldwin, afterwards a Judge of the United States Supreme Court, but then a leading lawyer of Pittsburgh. He may have helped to build the furnace.

Gordon, in his *Gazetteer of the State of Pennsylvania*, states that in 1832 there were in operation in Westmoreland county one furnace, Ross, operated by Colonel Mathiot, and one forge, Kingston, on Loyalhanna creek, operated by Alexander Johnston. The latter gentleman, whose name appears above in connection with two other iron enterprises was the father of Governor William F. Johnston. He was born in Ireland, of Scotch parents, in July, 1772, and died July 15, 1872, one hundred years old. The early Westmoreland furnaces shipped pig iron by boats or arks on the Conemaugh and Allegheny rivers to Pittsburgh, much of which found its way down the Ohio river to Cincinnati and Louisville.

Other furnaces in Westmoreland county were, Mount Pleasant, a very early furnace; California, built by Col. J. D. Mathiot and S. Cummins about 1852, on Furnace run branch of the Loyalhanna creek, about a mile above the mouth of the run; Oak Grove, built in 1854 by Colonel John Clifford, near Ligonier, and owned in 1857 by James Tanner, of Pittsburgh; Valley furnace, at Hillsview, nine miles south of New Florence, built by L. C. Hall & Co. in 1855; Laurel Hill, about three miles below Baldwin furnace, on Laurel run, after its junction with Powder Mill run, commenced in 1845 or 1846 by Hezekiah Reid and finished about 1849 by Judge J. T. Hale of Centre county, and subsequently owned by various parties; Conemaugh, on the stream of that name, about eight miles west of Johnstown, built in 1847 by John C. Magill, Hon. Henry D. Foster, and Hon. Thomas White, and subsequently operated by George Rhey; Lockport, built in 1844 by William D. and Thomas McKernan at the town of that name, twenty miles west of Johnstown, subsequently owned by William McKinney, of Lockport, finally falling into the hands of Dr. Peter Shoenberger; Ramsey, built in 1847, on the Kiskiminetas, about four miles west of Saltsburg, Indiana county, by Frederick Overman, for Dr. J. R. Speer, of Pittsburgh, its owner.

All of the above furnaces have been abandoned. There is only one furnace in the county now in operation, Charlotte, built by Everson, Knap & Co., at Scottdale, in 1873, where the firm of Everson, Macrum & Co. built a rolling-mill in the same year.

Shade furnace was built in 1807 or 1808, and was the first iron establishment in Somerset county. It was erected on the banks of Shade creek, about forty rods below the junction of Clear Shade and Dark Shade creeks. David Rodger, an old resident at Shade furnace, informs us that it was built by Gerehart & Reynolds upon land leased from Thomas Vickroy. Being in debt, their furnace and lease were sold by the sheriff to Ogle & Kimmell, of Somerset, who were succeeded in the ownership by Thomas Gaghegan, who gave way to one Dunlap, when the property seems to have reverted to Thomas Vickroy. In November, 1813, we learn that Vickroy advertised Shade furnace for sale, at a great bargain, the advertisement appearing in the Pittsburgh *Mercury*, published by John M. Snowden. A sale was effected in 1819 to Mark Richards, Anthony S. Earl, and Benjamin Johns, of New Jersey, constituting the firm of Richards, Earl & Co., who operated the furnace down to about 1830. In 1820 they built a forge called Shade, three-fourths of a mile below the furnace, which was carried on by them for four or five years, when they were succeeded first by William Earl and afterwards by John Hammer. The furnace was continued, at intervals, after 1830, by other proprietors, and was in blast to the close of 1858. Daniel Weyand, Esq., of Somerset, at the time of his death, in September, 1877, was the owner of the property.

About 1811 Joseph Vickroy and Conrad Piper built Mary Ann forge, on Stony creek, about five miles below Shade furnace, and a half mile below the mouth of Shade creek. The forge was named after Mr. Piper's wife, who was a daughter of Thomas Vickroy and sister of Joseph Vickroy. David Livingston was subsequently the owner of the forge, and operated it for several years. Richard Geary, the father of Governor John W. Geary, was the millwright who built the forge for the owners We have heard that pig iron was sometimes packed on horseback to this forge from Bedford county, the horses taking salt from the Conemaugh saltworks and bar iron as a return load.

In the year 1809 or 1810 Peter Kimmell and Matthias Scott built a forge for the manufacture of bar iron on Laurel Hill creek, now in Jefferson township, in the western part of Somerset county. Mr Kimmell shortly after withdrew, and the establishment was run by Mr. Scott. Subsequently it passed into the hands of Henry Benford and Jacob Ankeny, and ceased operations about 1815. Supplies of metal were obtained from Bedford and Fayette counties. About the year 1810 Robert Philson erected a forge and furnace on Casselman's river, in Turkeyfoot township. The ore was mined in the immediate vicinity. The enterprise was a bad investment, operations ceasing in three or four years. The next furnace in the county was Jackson furnace, near the Pittsburgh turnpike, on Laurel hill, built by Irvin Horrel, Philip Murphy, and Charles Ogle about 1825. It was unsuccessful in their hands. About 1833 Joseph and William Graham again put it in blast, only to be overcome by speedy disaster. In 1832 Gordon stated that there were three furnaces and three forges in the county then in existence. Rockingham furnace, two miles above Shade furnace, on Shade creek, was built in 1844 by John Foust, and subsequently operated by Custer & Little; Somerset furnace, at Fordwardstown, was built by Huber, Linton & Myers in 1846, and afterwards owned by G. Ross Forward; and Wellersburg furnace was built by the Union Coal and Iron Company, in 1856, under the management of G. Ross Forward. All the furnaces and forges in Somerset county have been abandoned.

The first iron enterprise in Cambria county was a forge at Johnstown, built by John Buckwalter, of Chester county, on Stony creek, in 1809, and subsequently removed to the Conemaugh river, also at Johnstown, where it was operated with more or less regularity down to about 1825, although it was standing many years later. Its last owner was Peter Levergood. It was used to hammer bars out of Juniata pig iron. John Buckwalter was a descendant of Francis Buckwalter, a Protestant refugee from Germany, who emigrated to the vicinity of Phœnixville, in Chester county, in 1720, where he purchased 650 acres of land for £195 In 1810 it is recorded that about 200 pounds of nails, valued at $30, were made at Johnstown, by one establishment. In 1818 nails at Johnstown were cut with a machine worked by a treadle, but without heads, which were afterwards added with another machine. The enterprise was established by Mr. Pearson. Cambria county has been noted as an iron centre since its first furnace, Cambria, was built by George S. King, David Stewart, John K. Shryock, and William L. Shryock in 1841, on Laurel run. It was followed by Mill Creek, built by John Bell & Co. in 1845; Ben's Creek, built by George S. King & Co. in 1846; Eliza, five miles west of Ebensburg, on Blacklick creek, commenced by Ritter & Rodgers in 1846 and completed by Ritter & Irvin in 1847; Mount Vernon, at Johnstown, built by Peter Levergood & Co. in 1846, and subsequently owned by Lintons & Galbreath; and Ashland, six miles north of Gallitzin, built by Joseph A. Conrad and Hugh McNeal in 1847. All these furnaces have been abandoned. The division line between Cambria and Indiana counties passed through the stack of Eliza furnace. The Cambria ironworks, at Johnstown, were commenced in 1853 by a company of which Mr. King was the originator. There are now connected with the rolling-mill several large furnaces at Johnstown and in Blair county. In 1832 Gordon referred to the prospect of making iron from native ore in Cambria county as follows:—"And there is iron, as it is said by some, *but denied by others.*" To the enterprise of George S. King is this county indebted for the development of the iron ore within its borders.

The first iron enterprise in Indiana county was Indiana forge, on Findley's run, near the Conemaugh, built about 1837 by Henry Noble, who also built a small furnace as early as 1840. Both the furnace and forge were running in the last-named year. Pig iron for the forge was at first obtained from Allegheny furnace, in Blair county. Becoming embarrassed, Mr. Noble was succeeded by William D. and Thomas McKernan about 1843. About 1846 the property passed into the hands of Elias Baker, who built a new furnace and forge. Other furnaces in Indiana county were, Blacklick, built by David Stewart in 1846; Buena Vista, built by McClelland & Co. in 1847; and Loop, built by Hampton & Smith in 1847. Blacklick and Buena Vista were located on Blacklick creek, and Loop on the Little Mahoning, three miles below Smicksburg. All the Indiana furnaces and its solitary forge have been abandoned.

Beginning of the Iron Industry in Northwestern Pennsylvania.—A blast furnace was built at Beaver Falls, on the west side of Beaver river, in Beaver county, in 1802, by Hoopes, Townsend & Co., and blown in in 1804. A forge was connected with it from the beginning, and was in operation in 1806, according to Cramer's *Pittsburgh Almanac.* Both the furnace and forge were in operation in 1816. The whole enterprise was abandoned about 1826. The ore used was picked out of gravel banks in the neighborhood in very small lumps. It has been erroneously stated that this was the only furnace erected in Beaver county. There was another early furnace in this county, named Bassenheim, built by Detmar Basse Müller, the history of which is so interesting that we make room for the following letter we have received from Mr. Henry Muntz, an aged citizen of Zelienople in Butler county.

> Bassenheim furnace was built and put into operation in the year 1814 by Dettmar Basse, a German gentleman of education, much enterprise, and some means. He carried it on to 1818, when he sold out to Daniel Beltzhoover, Robinson & McNickle, who worked it five or six years more. About that time, viz., 1824, the charcoal and iron ore beginning to fail in the neighborhood, and their capital being pretty much sunk, they ceased operations and retired, leaving the furnace a ruin, and now there is nothing to mark the place of its location except a large stack of stone overgrown with moss and bushes, and also a great pile of cinders, clinkers, and ashes, to show where the furnace had been. This furnace was not located in Butler county, but in the adjoining county of Beaver, between two and three miles from Zelienople and lower down the Connoquenessing creek and about a mile west of the Butler county line. Its owners, Dettmar Basse and also Daniel Beltzhoover, resided at Bassenheim farm on the Butler side of the county line, and much of its business was transacted at Zelienople. These circumstances will account for the popular belief that this furnace was located in Butler county. There was no forge connected with it, nor any other work except to convert iron ore into pig metal, stoves, kettles, pots, fire irons, etc. The ore was mostly dug out of the ground within a mile or two of the furnace in lumps weighing from one pound to fifty, generally of a blue color. At first the bellows was blown by water-power, but, after the high water of the creek had washed one of the abutments of the dam away and let the water out, the owners were obliged to apply a steam engine at considerable expense, by which it was afterwards operated with much trouble and little profit. After the war of 1812 times were very hard and money exceedingly scarce. One other reason that this work did not succeed and pay better was the great expense of getting its metal and wares to a market. I remember well that in February, 1818, $12 per ton were paid for hauling the pig metal to Pittsburgh, thirty miles over a bad road.

John Henry Hopkins, afterwards Bishop of Vermont, and already mentioned in connection with General St. Clair's furnace near Ligonier, was engaged as a clerk at Bassenheim furnace about 1815.

Still another furnace in Beaver county was Homewood, in the northwestern part of the county, on the Beaver canal, near the mouth of the Connoquenessing creek, and two miles from Homewood station on the Pittsburgh, Fort Wayne and Chicago Railway. It was built by James Wood, of Pittsburgh, to use coke or bituminous coal, and was put in blast in 1858. It was finally blown out in 1867 or 1868.

Prior to 1846 there were only a few furnaces in the Shenango valley, all charcoal, one of the oldest of which was Springfield furnace, on a small run, half a mile from Leesburg, and seven miles southeast of Mercer, built in 1837. The first furnace in Lawrence county was probably Martha, at New Castle, built in 1844 to use charcoal. In 1849 it was owned by Power & Sons, and was soon afterwards abandoned. Cossallo rolling-mill was built at New Castle in 1842. by the Cossallo Iron Company, and Orizaba, at the same place, in 1847, by Peebles & Co. In 1846, and soon afterward, several furnaces were built in this valley to use its splint coal in the raw state, particular mention of which, owing to their modern origin, is not deemed necessary. In 1876 there were 32 such furnaces in the valley, besides several rolling-mills.

We are able to fix the date of the erection of the first furnace in the once important but now neglected ironmaking district composed of Armstrong, Butler, Clarion, Venango, and other northwestern counties. This event took place in the year 1818, when Bear Creek furnace, in Armstrong county, one mile from Lawrenceburg in Butler county, was commenced by Ruggles, Stackpole & Whiting, who then owned the Pittsburgh rolling-mill. In the following year, owing to the failure of Ruggles, Stackpole & Whiting, it passed uncompleted into the hands of Baldwin, Robinson, McNickle & Beltzhoover, and was probably purchased by them to supply pig metal to their rolling-mill at Pittsburgh. The furnace went into operation in 1819. It was abandoned long before 1850, but was running in 1832, in which year Gordon says it was owned by Henry Baldwin, Esq., and was reputed to be the largest furnace in the United States, having made forty tons of iron a week. The building of this furnace was superintended by Thomas C. Lewis, the projector of Colonel Isaac Meason's rolling-mill on Redstone creek, in Fayette county. The furnace was built to use coke, with steam-power. Its first blast was with this fuel, but the blast was too weak, and the furnace chilled after two or three tons of iron had been made. Charcoal was then substituted. This furnace had a tramroad, with wooden rails, in 1818. It is due to the memory of the pioneer, Thomas C. Lewis, that we should state that it was against his earnest advice that the blast used in blowing in Bear Creek furnace with coke was insufficient. He predicted the failure which occurred. The blast was cold, and was only about five pounds to the square inch.

The number of ironworks erected in the State in the ten years ending with 1830 was forty-nine, of which thirty were forges and rolling-mills and nineteen were blast furnaces. Some of these furnaces were in Butler and adjoining counties. After the manufacture of iron at Pittsburgh was fairly started about 1825, a demand was created for more pig iron than the Juniata valley and Fayette county could supply. This led to the development of the iron-ore beds in Clarion, Butler, Armstrong, and Venango counties. Rock furnace, on Roaring run, a tributary of the Kiskiminetas, four miles east of Apollo, in Armstrong county, was built about 1825 by James W. Biddle, of Pittsburgh, and others. In 1832 Biddle is said by Gordon to have owned this furnace, which produced about fifteen tons of iron a week. It has been abandoned since 1855. Slippery Rock furnace, in Butler county, and Clarion furnace, in Clarion county, were built in 1828—the latter by Hon. Christian Myers, a native of Lancaster county. Allegheny furnace, at Kittanning, in Armstrong county, and Venango furnace, on Oil creek, in Venango county, were built in 1830. In 1832 the former was owned by A. McNickle, and made about fourteen tons of iron weekly. From 1830 to 1850, but particularly after the passage of the tariff of 1842, this section of the State produced large quantities of charcoal pig iron. We particularize a few of the furnaces built soon after 1830: Beaver, five miles south of Shippenville, Clarion county, in 1835; Madison, on Piney creek, same county, in 1836; Shippen, near Shippenville, same county, in 1832; Lucinda, eight miles north of Clarion, in 1833; Clay, on Horse creek, Venango county, in 1832; Van Buren, on the Allegheny river, two miles southeast of Franklin, same county, in 1832; Rockland, in the same county, in 1832; Slab, on East Sandy creek, same county, in 1834; Mill Creek, in the same county, in 1835. There was no forge in Armstrong county in 1832, but there were a few forges in Butler and Venango counties. A forge was built at Shippenville in 1833. After 1840 there was remarkable activity in the manufacture of iron in this district. In 1850 there were 11 furnaces in existence in Armstrong county, 6 in Butler, 28 in Clarion, and 18 in Venango—63 in all. In 1858 there were 18 in Armstrong, 6 in Butler, 27 in Clarion, and 24 in Venango—75 in all. Many of these furnaces had, however, been abandoned at the latter date. Nearly every one has since then been abandoned. The discovery that bituminous coal could be profitably used in the manufacture of pig iron, and the subsequent discovery of the rich ores of Lake Superior, were influences which tended greatly to destroy the business of making charcoal pig iron in the counties named, and in Fayette, Westmoreland, Somerset, Cambria, and Indiana counties, and correspondingly to develop the iron business in the Shenango valley and elsewhere. But the distance of many of these furnaces from market, the lack of cheap means of transportation, and the growing scarcity of charcoal timber also had much to do with the abandonment of Western and Northwestern Pennsylvania charcoal furnaces. It is not improbable that the manufacture of pig iron in the Allegheny valley and in Fayette county may yet be revived by the general substitution of Connellsville coke for charcoal, as iron ore is still abundant.

The Great Western ironworks at Brady's Bend were commenced in 1840, embracing a rolling-mill and four furnaces to use coke. They have not been in operation for several years.

The iron manufactured in the Allegheny valley was taken down the Allegheny river on keel-boats and arks, the business of transporting it, as may readily be conjectured, being quite extensive.

Erie charcoal furnace, at Erie, was built in 1842, and abandoned in 1849. It used bog ore. It was owned by Charles M. Reed. Liberty furnace, on the north side of French creek, in Crawford county, was built in 1842 by Lowry & Co., of Meadville, and abandoned in 1849.

At the Siberian rolling-mill of Rogers & Burchfield, at Leechburg, Armstrong county, natural gas, taken from a well 1,200 feet deep, was first used as a fuel in the puddling furnace. In the fall of 1874 it was announced that during the preceding six months the gas had furnished all the fuel required for puddling, heating, and making steam, not one bushel of coal having been used.

Iron Ore has been found in Elk, Potter, Bradford, Juniata, and Wayne counties. Ore has recently been mined at Austinville, Columbia township, Bradford county.

First Use of Bituminous Coke in the Manufacture of American Pig Iron.—Pig iron manufactured from bituminous coke is claimed to have been first made as a regular product in the United States by F. H. Oliphant, at Fairchance furnace, near Uniontown, Fayette county, Pennsylvania, in 1836. Mr. Oliphant sent to the Franklin Institute of Philadelphia samples of the metal produced and of the various materials used at his furnace. He did not, however, long continue to make coke iron, and resumed the manufacture of iron with charcoal. William Firmstone was successful in 1835 in making good gray forge iron for about one month at the end of a blast at Mary Ann furnace, in Trough Creek valley, Tod township, Huntingdon county, Pennsylvania, from coke made from Broad Top coal. This iron was taken to a forge two miles distant and made into blooms. We have been unable to verify the statement in French's *Iron Trade of the United States* (1858) that "coke was employed a few years before the Revolution in the manufacture of pig and refined bar iron." Undoubtedly, however, various attempts were made to use it before the successful experiments of Mr. Firmstone and Mr. Oliphant were made. We have recorded an unsuccessful attempt to use coke at Bear Creek furnace in 1819. The Legislature of Pennsylvania passed an act June 16, 1836, "to encourage the manufacture of iron with coke or mineral coal," which authorized the organization of companies for the manufacture, transportation, and sale of iron made with coke or coal. Between 1835 and 1839 attempts were made at Karthaus, in Clearfield county, and at Farrandsville, in Clinton county, on the west branch of the Susquehanna river, and at Astonville furnace, near Frozen run, in Lycoming county, to use coke, but the experiment was unfortunate in each instance. At Karthaus several hundred tons in all of white iron were produced at irregular intervals in a furnace which was built in 1836 by Peter Ritner (a brother of Governor Ritner) and John Say, and it ran spasmodically upon coke with cold blast until 1838. In that year Henry C. Carey, Burd Patterson, John White, and others, constituting the Clearfield Coal and Iron Company, employed William Firmstone to take charge of the furnace. In 1839 he put in a hot blast and raised the stack nine feet, making it 45 feet high, with boshes 13 feet in diameter. The furnace was blown in in September, and made several hundred tons of good foundry iron by the close of the year, when the whole enterprise was abandoned, owing to the lack of proper transportation facilities. At Farrandsville, as we are informed by General Daniel Tyler, 3,500 tons of iron were made, but at such great cost, owing to the impurity of the coal and the distance of the ore, that further efforts to make iron with coke were abandoned. The furnace was blown in, according to General Tyler, in the summer of 1837, and ran probably until 1839. It was fitted up with a hot-blast apparatus, made in Glasgow, and the best known at that time in Scotland. The furnace at Frozen run made some iron from coke, but how much is not stated. In September, 1839, it was using charcoal. Lonaconing furnace, in Allegheny county, Maryland, was built in 1837, by the George's Creek Company, to use coke, and in June, 1839, it was making about 70 tons per week of good foundry iron. In the Frostburg coal basin of Maryland, nine miles northwest of Cumberland, two large blast furnaces were built in 1840, by the Mount Savage Company, to use coke. This enterprise was also successful. But the use of coke did not come rapidly into favor, and many experiments with it were attended with loss.

In 1849 there were only four furnaces in Pennsylvania which were classed as coke furnaces—those of the Brady's Bend Iron Company, and they made no iron in that year. In 1853 the Cambria Iron Company built four coke furnaces at Johnstown, which were blown in successfully, and have been in almost constant operation to this day. In 1854, so slowly had the whole country progressed in the manufacture of pig iron from raw bituminous coal and coke, that the total production from these two kinds of fuel in that year was only 54,485 net tons, Pennsylvania making 29,941 tons; Ohio, 15,000 tons; and other States, 9,544 tons. In 1876 the make of bituminous coal and coke pig iron in the whole country exceeded that of anthracite, and was more than treble that of charcoal. In that year the production of pig iron was as follows: bituminous coal and coke, 990,009 net tons; anthracite, 794,578 tons; charcoal, 308,649 tons.

First Use of Anthracite Coal in the Manufacture of Pig Iron.—Down to 1838 all the blast furnaces in the United States, with the exception of a few coke furnaces, used charcoal for fuel. In that year pig iron was successfully made in Pennsylvania from anthracite coal. We present below a complete account of the first steps that were taken to use the new fuel in blast furnaces.

In 1840 Jesse B. Quinby testified, in the suit of Farr & Kunzi against the Schuylkill Navigation Company, that he used anthracite coal at Harford furnace, Maryland, mixed with one-half charcoal, in 1815. He believed himself to be the first person in the United States to use anthracite coal in smelting iron. In 1826 the Lehigh Coal and Navigation Company erected near Mauch Chunk a small furnace intended to use anthracite in smelting iron. The enterprise was not successful. In 1827 unsuccessful experiments in smelting iron with anthracite coal from Rhode Island were made at one of the small blast furnaces in Kingston, Plymouth county, Massachusetts. These experiments failed because the blast used was cold. About 1827 a similar failure in the use of anthracite took place at Vizille, in France. Doubtless other unsuccessful attempts than those here recorded were made to smelt iron ore with anthracite coal, but these were probably the earliest.

In 1828 James B. Neilson, of Scotland, obtained a patent for the use of hot air in the smelting of iron ore in blast furnaces, and in 1837 the smelting of iron ore with anthracite coal by means of the Neilson hot-blast was successfully accomplished by George Crane, at his ironworks at Ynyscedwin, in Wales. Mr. Crane began the use of anthracite with hot blast on the 7th of February, 1837, in a blast furnace, obtaining 36 tons a week. In May of that year Solomon W. Roberts of Philadelphia visited his works and witnessed the complete success of the experiment. Mr. Crane had taken out a patent on the 28th of September, 1836, for smelting iron ore with anthracite coal. Upon the recommendation of Mr. Roberts, after his return from Wales, the Lehigh Crane Iron Company was organized in 1838 to manufacture pig iron from the anthracite coal of the Lehigh valley. In that year Erskine Hazard went to Wales for the company, and there made himself acquainted with the process of making anthracite iron. He ordered to be made such machinery as was necessary, under the direction of George Crane, the inventor, and engaged David Thomas, who was familiar with the process, to take charge of the erection of the works and the manufacture of the iron. Mr. Thomas arrived in the summer of 1839, and to his faithful and intelligent management much of the success of the enterprise is due. The first furnace of this company was successfully blown in on the 4th of July, 1840. But it was not the first successful anthracite furnace in this country, as will presently appear.

On the 19th of December, 1833, a patent was granted to Dr F. W. Geissenheimer, of New York, for smelting iron ore with anthracite coal, by the application of heated air. Dr. Geissenheimer made experiments in smelting iron ore with anthracite at the Valley furnace, near Pottsville, but they were not successful, although the results achieved were regarded as highly encouraging. During the fall and winter of 1837 Messrs. Joseph Baughman, Julius Guiteau, and Henry High, of

Reading, experimented in smelting iron ore with anthracite coal in the old furnace of the Lehigh Coal and Navigation Company at Mauch Chunk, using about eighty per cent. of anthracite. The results were so encouraging that they built a small water power furnace near the Mauch Chunk weigh-lock, which was completed in July, 1838. Blast was applied to this furnace August 27, and discontinued September 10, the temperature being heated up to about 200° F. The fuel used was mainly anthracite, but not exclusively. A new heating apparatus was procured, consisting of 200 feet of cast-iron pipe, 1½ inches thick, placed in a brick chamber at the tunnel-head, and heated by a flame therefrom. Blast was applied late in November, 1838, the fuel used being anthracite exclusively, and "the furnace worked remarkably well for five weeks," up to January 12, 1839, when it was blown out for want of ore. Some improvements were made, and on July 26, 1839, the furnace was again put in blast and so continued until November 2, 1839, Mr. F. C. Lowthrop, of Trenton, being one of the partners at this time. For "about three months" no other fuel than anthracite was used, the temperature of the blast being 400° to 600° F. Open tuyeres were used. About 100 tons of iron were made.

In 1837 Jarvis Van Buren, acting for a company, built a furnace at South Easton, in Northampton county, for the purpose of experimenting with anthracite coal as a fuel. Early in 1838 he was successful in making twenty tons of pig iron, when further operations were stopped in consequence of the blast being too weak. We are not informed whether the blast was warm or cold.

The next furnace to use anthracite was the Pioneer, built in 1837 and 1838 at Pottsville, by William Lyman, of Boston, under the auspices of Burd Patterson, and blast was unsuccessfully applied July 10, 1839. Benjamin Perry, who had blown in the coke furnace at Farrandsville, then took charge of it, and blew it in October 19 1839, with complete success. This furnace was blown by steam-power. The blast was heated in ovens at the base of the furnace, with anthracite, to a temperature of 600°, and supplied through three tuyeres at a pressure of 2 to 2½ lbs. per square inch. The product was about 28 tons a week of good foundry iron. The furnace continued in blast for some time. A premium of $5,000 was paid by Nicholas Biddle and others to Mr. Lyman, as the first person in the United States who had made anthracite pig iron continuously for one hundred days. Danville furnace, in Montour county, was built by Biddle, Chambers & Co., and was successfully blown in with anthracite in April, 1840, producing 35 tons of iron weekly with steam-power. Roaring Creek furnace, in Montour county, built in 1839 by Burd Patterson & Co., was next blown in with anthracite, May 18, 1840, and produced 40 tons of iron weekly with water-power. A charcoal furnace, at Phœnixville, built in 1837 by Reeves, Buck & Co., was blown in with anthracite, June 17, 1840, by William Firmstone, and produced from 28 to 30 tons of pig iron weekly with water-power. The hot-blast stove, which was planned and erected by Julius Guiteau, of the Mauch Chunk furnace, was situated on one side of the tunnel head, and heated by the escaping flame of the furnace. This furnace continued in blast until 1841. Columbia furnace, at Danville, was built in 1839 by George Patterson, and blown in with anthracite by Mr. Perry on July 2d, 1840, and made from 30 to 32 tons of iron weekly, using steam-power. The next furnace to use anthracite, and the last one we shall mention, was built at Catasauqua, for the Lehigh Crane Iron Company, in 1839, by David Thomas. It was successfully blown in by him on the 4th of July, 1840, as we have stated, and produced 50 tons a week of good foundry iron, water-power being used. Mr. Thomas was born in Wales in 1794, and is still living in the full enjoyment of all his faculties.

Mr. Firmstone writes that, at three of the above-mentioned furnaces, the Mauch Chunk, Phœnixville, and Columbia, the hot-blast ovens were heated by the flame escaping from the furnace; at the others the ovens and boilers were on the ground, and heated by independent fires. At that early day the plan, now so general, of conveying the escaping gas in air-tight conduits to the boilers and ovens was not adopted. It was introduced by Mr. C. E. Detmold, a German engineer, now of New York, two or three years later. This method, which has since been greatly improved in American practice, was patented in France by Thomas & Laurens, and in Germany by Faber du Faur. Mr. Detmold was the agent of the last-named gentleman.

It will be observed that, while Mr. Neilson invented the hot blast, Dr. Geissenheimer was the first to propose the use of anthracite coal by means of heated air for the manufacture of pig iron, and that Mr Crane was the first to successfully apply the hot blast of Mr. Neilson to this purpose. Dr. Geissenheimer experimented as early as 1833 with ovens for heating air before its introduction into the blast furnace in which anthracite was used as a fuel, and his patent bears date in that year; but his invention was not successfully applied until after Mr. Crane had made iron at Ynyscedwin. Dr. Geissenheimer is entitled to the honor of having proposed what Mr. Crane was the first to accomplish. His patent, limited to the United States, was purchased by Mr. Crane, who, in November, 1838, patented some additions to it in this country. The patent was never enforced here, but Mr. Crane compelled the ironmasters of Great Britain to pay him tribute. Dr. Geissenheimer died at Lebanon, Pa., where he had long resided.

The discovery, in 1839 and 1840, that anthracite coal could be successfully used in the manufacture of pig iron gave a great impetus to the iron industry in Maryland, New Jersey, and New York, as well as in Pennsylvania. The rich magnetic ores of New Jersey were first smelted with anthracite coal by Edwin Post, Esq., at Stanhope, in 1840. On the 1st of January, 1876, there were 225 anthracite furnaces in the country.

It is claimed that anthracite coal for the generation of steam was first used in this country in 1825 under the boilers of the rolling-mill at Phœnixville. It is also claimed that two years later, in 1827, the first use of anthracite coal in the puddling furnace in this country was at the same rolling-mill. Jonah and George Thompson were the proprietors at the time. The use of anthracite for puddling did not become general until about 1840. In 1839 Ralph Crooker puddled with anthracite at the Boston Iron Company's works. About 1836 Thomas and Peter Cooper, brothers, used anthracite in a heating furnace at their rolling-mill in Thirty-third street, near Third avenue, New York, and about 1840 they began to puddle with anthracite.

First Use of Raw Bituminous Coal in the Manufacture of Pig Iron.—The bituminous coal of Eastern Ohio and Western Pennsylvania was the first that was successfully used in this country in its raw state for the reduction of iron ore in the blast furnace. The history of the beginning of this branch of our iron industry is circumstantially and we believe correctly stated in the following extract from a pamphlet entitled *Youngstown, Past and Present*, printed in 1875.

> In July, 1845, Himrod & Vincent, of Mercer county, Pa., blew in the Clay furnace, not many miles from the Ohio line, on the waters of the Shenango. About three months afterwards, in consequence of a short supply of charcoal, as stated by Mr. Davis, their founder, a portion of coke was used to charge the furnace. Their coal belongs to seam No. 1, the seam which is now used at Sharon and Youngstown, in its raw state, variously known as "free-burning splint," or "block coal," and which never makes solid coke. A difficulty soon occurred with the cokers, and, as Mr. Himrod states, he conceived the plan of trying his coal without coking. The furnace continued to work well, and to produce a fair quality of metal. At the same time Messrs. Wilkinson, Wilkes & Co. were building a furnace on the Mahoning, at Lowell, Mahoning county, Ohio, intending to use mineral coal from seam No. 1, on which they owned a mine near Lowell. The credit of making the first iron with raw bituminous or semi-bituminous coal, in the United States, belongs to one of these firms. An account of the blowing in of the Lowell furnace, on the 8th of August, 1846, may be seen in the *Trumbull Democrat*, of Warren, dated August 15, 1846, where it is stated that to "these gentlemen (Wilkinson, Wilkes & Co.) belongs the honor of being the first persons in the United States who have succeeded in putting a furnace in blast with raw bituminous coal." According to Mr. Wilkes, writing from Painesville, April 2, 1869, this furnace was run with coke several months, but at what time it does not state. It is admitted that Mr. David Himrod, late of Youngstown, produced the first metal, with raw coal, about the close of the year 1845, and has continued to use it ever since. The friends of Wilkinson & Co. claim that it was an accident, and a necessity, while their works were built and intended for raw coal.

In 1850 there were only four furnaces in the Mahoning valley and only seven in Pennsylvania (in Mercer county) which used raw bituminous coal. In 1876 there were 206 furnaces in the country using either raw or coked bituminous coal when in blast.

First Use of Lake Superior Iron Ore in the Blast Furnace.—The honor of having first used the iron ore of Lake Superior in a blast furnace is clearly due to David and John P. Agnew, brothers, proprietors of the Sharpsville furnace, at Sharpsville, Mercer county, Pennsylvania. This occurred in 1853, the same year in which three or four tons of the ore were shipped to the World's Fair at New York. The ore used at Sharpsville was procured from the Jackson mine, the pioneer of all the Lake Superior iron mines, and was mined and shipped before the completion of the railroad to the mine or the building of the docks at Marquette. The following extract from a letter which we have received from Mr. David Agnew gives the leading facts of the important experiment:

> I claim that D. & J. P. Agnew were the first to use Lake Superior iron ore in a blast furnace, (the Sharpsville,) and that the experiment was successful. The facts are as follows: A small amount of Lake Superior ore was brought from Lake Superior before the completion of the canal and locks at the outlet of the lake, at a heavy expense, merely for trial. The first small canal-boat load from Erie was by request brought to the Sharpsville furnace, and there used as stated. The second boat-load was intended to be left at Clay furnace, but in mistake was brought on to Sharpsville, and the next day was reshipped back to Clay furnace. The Sharon Iron Company, owning and controlling this ore, (the Jackson mine,) had purchased the Clay furnace, and very naturally wished to try it in their own furnace. These two small boat-loads carried all the ore received from Lake Superior until the following year, (1854,) when our connection with the Sharpsville furnace had ceased. The quantity used by us was small, yet sufficient to establish our claim.

Mr. Frank Allen, who was the manager of Clay furnace in 1853, has published a statement which corroborates the above in all essential particulars, but also shows that the Clay furnace was the first in the country to make the manufacture of iron from Lake Superior ore a regular business and a commercial success. This result was not accomplished until 1856. Mr. Allen says:

> On the last day of November, in 1853, Samuel Clark boated a load of said ore from the Sharpsville furnace to the Clay furnace landing. We put it through the furnace and sent the product to Sharon. The next season all the Lake Superior ore left over at the Sharpsville furnace was sent to us, and during the years 1854–5, and until August, 1856, we had used in all about 400 tons of Lake Superior ore—some of it alone, but most of it mixed with other ores, and up to that date the working of it was not a success.
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> In October, 1856, we gave the Clay furnace a general overhauling, put in a new lining and hearth, and made material changes in the construction of the same, put her in blast late in the fall, and in a few days were making a beautiful article of

iron from Lake Superior ore alone, and this was then considered to be the first real and successful working of said ore in a blast furnace.

Beginning of the Manufacture of Cast Steel in the United States.—German or blister steel was made at an early day in several of the American colonies, and the steel made in Pennsylvania during the last century and the early years of the present century was of this description. Steel of this quality was used in the manufacture of plowshares, scythes, shovels, spades, and cross-cut and mill saws. In 1810 there were produced in this country 917 tons of steel, of which Pennsylvania produced 531 tons in five furnaces—one each in Philadelphia city, and in Philadelphia, Lancaster, Dauphin and Fayette counties. In 1813 there was a steel furnace at Pittsburgh, owned by Tuper & McKowan. In 1829 an Englishman named Broadmeadow and his son made blister steel at Pittsburgh, and about 1831 they melted cast steel of low grade in pots of their own manufacture. Their establishment was located at Bayardstown, near the old Fifth Ward market-house. Josiah Ankrim & Son, file-makers, at Pittsburgh, are said to have succeeded in making their own steel about 1830. In 1831 Messrs. Whitmore & Havens successfully produced blister steel at Pittsburgh. In this year there were in the country fourteen steel furnaces for the manufacture of low grade steel—two in Pittsburgh, one in Baltimore, three in Philadelphia, three in New York, one in York, Pa., one in Troy, two in New Jersey, and one in Boston. Their united capacity was 1,600 tons of steel annually. No crucible cast steel was then made in the United States, although there had been various unsuccessful attempts to make it. In 1833 the firm of G. & J. H. Shoenberger commenced to manufacture blister steel at Pittsburgh, and in 1841 they attempted the manufacture of crucible cast steel, but only to add another to the list of failures. About 1840 the firm of Isaac Jones & William Coleman was formed at Pittsburgh to manufacture blister and spring steel, which business they successfully prosecuted until 1845, when they were succeeded by Jones & Quigg, who built the Pittsburgh steel works. In 1846 Coleman, Hailman & Co. commenced the manufacture of blister and plow steel at Pittsburgh. Both of these firms were successful in making all but first quality cast steel. The first slab of cast plow steel ever rolled in America was rolled by William Woods, at the steel works of Jones & Quigg, in 1846, and shipped to John Deere, of Moline, Illinois. About 1846 the firm of Tingle & Sugden, file-makers, at Pittsburgh, made their own steel. In 1850 the manufacture of American steel, all of low-grade quality, cast and blister, was confined to a few establishments, nearly all of which were in Pennsylvania. In that year thirteen establishments in Pennsylvania made 6,078 tons of steel, of which only

44 tons were cast steel. Of the thirteen establishments six were in Pittsburgh.

The following is a list of all the works in the State engaged in the conversion of steel in 1850, with their product: James Rowland & Co., Kensington, Philadelphia, 600 tons; J. Robbins, Kensington, 500 tons; Earp & Brink, Kensington, 100 tons; Robert S. Johnson, Kensington, 400 tons; W. & H. Rowland, Oxford, Philadelphia, 700 tons; R. & G. D. Coleman, Martic, Lancaster county, 400 tons; R. H. & W. Coleman, Castlefin, York county, 100 tons; Singer, Hartman & Co., Pittsburgh, Allegheny county, 700 tons; Coleman, Hailman & Co., Pittsburgh, 800 tons; Jones & Quigg, Pittsburgh, 1,200 tons; Spang & Co., Pittsburgh, 200 tons; G. & J. H. Shoenberger, Pittsburgh, 200 tons; S. McKelvy, Pittsburgh, 178 tons, these works having been in operation only six months: total, 13 works, with an annual product of 6,078 tons. Of this quantity only 44 tons were cast steel, as already stated.

In 1852 McKelvy & Blair, of Pittsburgh, made cast steel of good quality, but not of the best. In 1853 the firm of Singer, Nimick & Co. of Pittsburgh, which had been organized in 1848, and in 1855 Isaac Jones, then doing business in his own name, were successful in producing the higher grades of cast steel for saw, machinery, and agricultural purposes, but they did not make tool steel of the best quality as a regular product. That honor was reserved for a new firm, beginning business in 1859. In that year the firm of Hussey, Wells & Co. was successful in making crucible cast steel of best quality as a regular product at Pittsburgh, and three years later the firm of Park, Brother & Co., also of Pittsburgh, accomplished the same achievement. These were, we believe, the first firms in the country to meet with complete success in this difficult department of American manufacturing enterprise. Hussey, Wells & Co. were also the first in the country to fully demonstrate the fact that American iron is equal to the best Swedish iron in the manufacture of best cast steel.

The manufacture of crucible and other steel in this country has received an immense impetus since 1860. In that year there were thirteen steel-making establishments in the country, and in 1870 there were thirty, all devoted to the manufacture of steel other than Bessemer. In 1876, omitting Bessemer works, there were sixty steel works in the United States, of which thirty-nine made crucible cast steel, and the remainder made puddled steel, open-hearth steel, or steel from steel scrap. Of the thirty-nine which made crucible steel, seven also made German or blister steel. Of these thirty-nine works, one-half were located in Pennsylvania, most of them in Pittsburgh and its vicinity.

Introduction of the Bessemer Process into the United States.—The origin of the pneumatic or Bessemer process for converting pig iron into steel, through which a complete revolution in the manufacture of iron has already been effected, is scarcely twenty years old, although experiments looking to this result were commenced about twenty-six years ago. The process has been briefly explained to consist in forcing into molten pig iron, contained in a suitable vessel called a converter, streams of air under a high pressure, and, by the combination thus effected between the oxygen of the air and the carbon and silicon in the iron, decarburizing and desiliconizing the metal to the extent necessary to produce the desired temper of steel; the product thus made being cast into ingots or other forms, and treated in like manner as is customary in working cast steel.

The first person to suggest and to experiment upon the blowing of air into and through molten crude iron in a crucible or vessel without the use of fuel to retain the metal in the molten condition is believed to have been William Kelly, an ironmaster of Eddyville, Kentucky, who began at his furnace (Suwaunee) a series of experiments based upon this theory as early as 1851, a theory or principle which he patented in 1857. Henry Bessemer, of England, whose name has been given to the pneumatic process, secured his first patents for the manufacture of steel in 1855, but he did not announce his discovery of the pneumatic process until February 12, 1856, when it was patented. Mr. Bessemer secured patents in this country in the same year, but Mr. Kelly's claim of priority of invention was subsequently allowed by the Patent Office. But neither Mr. Kelly nor Mr. Bessemer was successful in making steel by the method each had respectively adopted.

Mr. Bessemer's process having failed to produce any successful result in the manufacture of steel, Robert F. Mushet, then of the Forest steel works, and now of Cheltenham, England, took out, on the 22d of September, 1856, a patent for his process of adding to molten pneumatized iron a molten triple compound of iron, carbon, and manganese, of which compound spiegeleisen was at that time the cheapest and most convenient form. The addition of from one to five per cent. of this compound to Bessemerized cast iron at once overcame the obstacle which had been fatal to the success of Mr. Bessemer's invention. Pending the publication of Mr. Mushet's patent, early in 1857, and during the erection for him of a blowing apparatus and small converter, provided by the late Samuel Holden Blackwell, of Dudley, Mr. Mushet obtained from the Ebbw Vale Iron Company a supply of Bessemerized hematite cast iron. This he melted in ordinary steel melting-pots, adding to the forty-four pounds' charge of each pot, when melted, two pounds of melted spiegeleisen. From this mixture ingots of from 500 to 800 pounds were cast, and one of these ingots was rolled at the Ebbw Vale iron works into a double-headed rail, which was sent to Derby railway station, on the Midland Railroad, to be laid down there at a place where iron rails had sometimes to be renewed within three months. This was early in 1857. Sixteen years afterwards, in June, 1873, the rail referred to was taken out. This was the first Bessemer steel rail ever laid down, and during its life-time about 1,250,000 trains and a like number of detached engines and tenders passed over it.

Having early in 1857 obtained the already-mentioned blowing apparatus and converter, Mr. Mushet was enabled in that year to cast small ingots of tool steel by the direct Bessemer process, with the addition of spiegeleisen by his own process. The first charge of Bessemer steel ever made with the addition of spiegeleisen was tapped from the small converter at Mr. Mushet's Forest steel works by a young workman, William Phelps, an iron miner, who is now, if living, a citizen of the United States.

In 1858 Mr. Goran Goransson, a Swedish ironmaster, operating upon fine manganesic Swedish pig iron, was enabled to produce Bessemer steel of excellent quality without adding spiegeleisen. Since then the Bessemer process has made rapid progress. Except in a few instances, when pure manganesic pig iron can be obtained, Mr. Mushet's process still continues to be absolutely essential in the manufacture of Bessemer steel. But Mr. Mushet, from adverse causes, over which he had no control, never received in his own country, nor in any European country, the reward which was fairly due to him. The Iron and Steel Institute of England, however, in 1876 awarded to him the Bessemer gold medal for that year, in recognition of the great value of his discovery.

While the Bessemer process was being perfected abroad, Mr. Kelly was experimenting with his invention in this country. These experiments was largely conducted in 1857–8–9 at the Cambria ironworks, at Johnstown. The first pneumatic converter in America was built at Johnstown for Mr. Kelly, but no true steel was converted in it, although refined iron was successfully produced.

In May, 1863, Messrs. E. B. Ward, of Detroit, D. J. Morrell, of Johnstown, William M. Lyon and James Park, Jr., of Pittsburgh, and Z. S. Durfee, of New Bedford, Massachusetts, having obtained control of the patents of William Kelly, organized the Kelly Process Company, under an agreement which gave the inventor and his representatives an interest which has proved to be of value. The company resolved to establish experimental works and also to acquire the patents in this country of Mr. Mushet for the use of spiegeleisen. Experimental works were accordingly established at Wyandotte, Michigan, and Mr. Durfee was sent to England to procure an assignment of Mr. Mushet's patents. The latter purpose was effected on the 24th of October, 1864, upon terms which admitted Mr. Mushet, Thomas D. Clare, and John N. Brown, of England, to membership in the Kelly Process Company. On the 5th of September, 1865, the company was further enlarged by the admission to membership of Charles P. Chouteau, James Harrison, and Felix Vallé, all of St. Louis.

The control in this country of Mr. Bessemer's original process, with all of the machinery necessary to its application, was obtained in 1864 by John F. Winslow, John A. Griswold, and Alexander L. Holley, all of Troy, New York, Mr. Holley visiting England in the interest of himself and associates. In the fall of that year the licensees of the Kelly patents succeeded in making Bessemer steel at their experimental works at Wyandotte, the works being under the general direction of William F. Durfee, who then made the first Bessemer steel in America. In February, 1865, Mr. Holley was successful at Troy in producing Bessemer steel at experimental works which he had constructed at that place in 1864 for the licensees of the Bessemer patents, Messrs. Winslow, Griswold and Holley. But as the licensees of the Kelly patents could not achieve success without Mr. Bessemer's machinery, and as the owners of the right to use this machinery could not make steel without Mr. Mushet's improvement, an arrangement was effected by which all the patents were consolidated early in 1866. Under this arrangement, the titles to the Kelly, Bessemer, and Mushet patents were vested in Messrs. Winslow, Griswold, and Morrell, the first two being owners of two-thirds of the property, and Mr. Morrell holding the other third in trust for the members of the Kelly Process Company. This arrangement continued until the formation of the Pneumatic Steel Association, a joint-stock company organized under the laws of New York, in which the ownership of the consolidated patents was continued, Mr. Morrell being the president and Z. S. Durfee the secretary and treasurer. The consolidation, in 1866, of the various interests, which was effected mainly through the exertions of Mr. Morrell, was followed by a large reduction in the fees and royalties charged to licensees, and thenceforward the business of making Bessemer steel was rapidly extended in this country. The Pennsylvania steel works, at Harrisburg, were the first works in the country, after those at Troy, to make Bessemer steel as a commercial product, their first blow taking place in June, 1867. The fourth Bessemer steel works in the country were erected near Lewistown, Pa., and were known as the Freedom iron and steel works. They made their first blow May 1, 1868. They did not produce a good quality of steel, and in 1870 the company failed and the works were abandoned. To-day Pennsylvania possesses five out of eleven Bessemer steel establishments in the United States.

Important improvements upon Mr. Bessemer's machinery have been invented and patented by Mr. Holley and other American engineers, and the blooming mill for the reduction of steel ingots, erected first at the Cambria ironworks by George Fritz and patented by him, has proved to be of great value. The Bessemer process has also been improved by the professional chemists connected with the American works, who are gradually emancipating the domestic manufacture from all dependence upon foreign metals and ores. It is universally admitted that in the United States this industry has been brought to a higher state of perfection than it has attained in any other country.

The first Bessemer steel rails ever rolled in this country were rolled at the North Chicago rolling-mill, on the 24th day of May, 1865, from hammered blooms made at the Wyandotte rolling-mill from ingots of steel made at the experimental steel works at Wyandotte. The American Iron and Steel Association was in session at Chicago at the time, and several of its members witnessed the rolling of these rails. One of the rails was taken to the hall occupied by the Association, and exhibited, and subsequently was placed on exhibition in the lobby of the Tremont House. The rolls upon which the blooms were rolled at the North Chicago rolling-mill were those which had been in use for rolling iron rails, and, though the reduction was quite too rapid for steel, the rails came out sound and well shaped. Several of these rails were laid in the track of one of the railroads running out of Chicago, and were still in use in 1875. The first steel rails rolled in the United States upon order, in the way of regular business, were rolled by the Cambria Iron Company, at Johnstown, Pa., in August, 1867, from ingots made at the works of the Pennsylvania Steel Company, at Harrisburg, Pa., and by the Spuyten Duyvil Rolling Mill Company, at Spuyten Duyvil, N. Y., early in September of that year, from ingots made at the Bessemer Steel Works, at Troy, New York, then owned by Messrs. Winslow & Griswold.

Introduction of the Siemens Gas Furnace and Siemens-Martin Process into the United States.—In 1856 Dr. C. W. Siemens, of London, England, the present president of the Iron and Steel Institute of that country, gave his attention, in conjunction with his brother, Frederick Siemens, both of whom were natives of Hanover, in Germany, to the construction of a gas furnace for the manufacture of iron, steel, glass, and other products which require a high and uniform heat. These gentlemen were successful in inventing the Siemens' regenerative gas furnace, which has since been largely adopted in Europe and in this country. In 1864 Messrs. Emile and Pierre Martin, of the Sireuil works, in France, with the assistance of Dr. Siemens, erected one of these furnaces to melt steel. In this furnace they produced cast steel of good quality and various tempers, and at the Paris Exposition of 1867 their product secured for them a gold medal. The Messrs. Martin subsequently obtained patents for various inventions of their own which were applicable to the manufacture of steel by the Siemens furnace.

Dr. Siemens had given his attention to the production of cast steel upon the hearth of a Siemens furnace since 1861, but had encountered great practical difficulties in establishing the process at the works of licensees of his furnace, namely, Charles Attwood, at Tow Law, in 1862, and the Barrow hematite works and the Fourchambault works in 1863 and 1864. Dr. Siemens claims, in a letter that is now before us, that, both at Tow Law and Fourchambault, cast steel had been produced upon the open hearth of a Siemens furnace, which had been specially constructed by himself for that purpose, from pig metal, spiegeleisen, and scrap iron, previous to Messrs. Martin's connection with the process. The furnace at Tow Law was a small one, and several such furnaces are still working there in the manner originally designed by Dr. Siemens.

In 1865 Dr. Siemens commenced the erection at Birmingham, in England, of steel works of his own, in which the regenerative furnace should be used in producing steel. These works, which were fully equipped for service in 1867, have produced most satisfactory results. The Messrs. Martin gave their attention, in the language of Dr. Siemens, to the production of steel by the dissolution of wrought iron and steel scrap in a bath of pig metal, while his efforts were more especially directed to the production of steel by the use of pig metal and iron ores, either in the raw state or in a more or less reduced condition, which latter process is the one mostly employed in the United Kingdom to-day. The former, or Siemens-Martin process, is the one that is chiefly used in this country, and the credit of introducing it is due to Hon. Abram S. Hewitt, of New York, who was favorably impressed with it when visiting the Paris Exposition in 1867 as a commissioner of the United States. By his request, Mr. Frederick J. Slade, his business associate, went to Sireuil to study the process in order to put it into practice in this country.

On the 1st of December, 1862, Park, McCurdy & Co., of Pittsburgh, sent Mr. Lewis Powe, the manager of their copper mill, to England to study the manufacture of tin plates. While there he visited Birmingham, and saw a Siemens gas furnace and procured one of the Siemens pamphlets containing a full description of it. On his return home he called the attention of Mr. James Park, Jr., to the advantages of the furnace. Immediately after the 4th of July, 1863, the erection of a Siemens gas furnace was commenced at the copper works. This furnace was erected for the purpose of melting and refining copper, and was completed on the 14th day of August, 1863. It worked well. It was constructed after the drawings contained in the Siemens pamphlet. In the fall of 1863 Mr. Powe revisited England, and while there had an interview with Dr. Siemens. Soon afterward the firm of Park, Brother & Co. built a Siemens furnace to heat steel, but it was not long in use. In 1864 James B. Lyon & Co., of Pittsburgh, built a Siemens gas furnace for making glass. The enterprise, however, although mechanically successful, met with an accident which suddenly brought it to an end. It is proper to state that the introduction into this country of the Siemens furnace by the above-named firms was accomplished in an irregular manner, without first obtaining a license from Dr. Siemens, who had patented his invention.

The first Siemens gas furnace which was regularly introduced into this country for any purpose was built by John A. Griswold & Co., at Troy, New York, and used as a heating furnace in their rolling-mill, the license having been granted on the 18th of September, 1867. The next gas furnace which was regularly introduced was used as a heating furnace by the Nashua Iron and Steel Company of New Hampshire, the license for which was granted on the 26th of September, 1867. The next furnace which was regularly introduced was built by Anderson & Woods, of Pittsburgh, for melting steel in pots, the license for which was dated in November, 1867. About 1869 the Lenox plate-glass works in Massachusetts also built a Siemens gas furnace. All of these furnaces gave satisfaction.

The first open-hearth furnace introduced into this country for the manufacture of steel by the Siemens-Martin process was built in 1868 by Cooper, Hewitt & Co., proprietors of the works of the New Jersey Steel and Iron Company at Trenton, New Jersey. The building of this furnace was commenced by this company in the spring of 1868, and in December of the same year it was put in operation.

The first successful application in this country of the Siemens furnace to the puddling of iron was under the direction of Mr. William F. Durfee, at the rolling-mill of the American Silver Steel Company, at Bridgeport, Connecticut, in 1869. Prior to this an unsuccessful attempt was made to accomplish the same result at the Eagle rolling-mill of James Wood & Co., at Saw Mill run, near Pittsburgh.

On the 1st of May, 1877, there had been built in this country 187 Siemens gas furnaces for use in the manufacture of steel and of iron and steel products, 88 of which were in Pennsylvania. Of the whole number, 35 were used in the production of crucible steel, 30 of which were in Pennsylvania, and 21 were used in the production of open-hearth steel, of which 5 were in Pennsylvania. In the year 1876 there were produced in the United States 21,490 net tons of open-hearth steel, of which Pennsylvania made 7,547 tons.

Experimental works have been erected at Pittsburgh in 1877, by Messrs. Park, Brother & Co., in conjunction with Messrs. Miller, Metcalf & Parkin, for the manufacture of wrought iron by a direct process invented by Dr. Siemens, and successfully tested by him at his experimental works at Towcester, England. The process embodies the application of the Siemens gas furnace.

The Whitwell Hot Blast was first applied in this country to the Rising Fawn furnace, in Dade county, Georgia, June 18, 1875. The first application of this hot-blast in Pennsylvania was made at the Dunbar furnace, in Fayette county, in February, 1877.

First Iron Rails Made in the United States.—It has been stated by an English writer that the first rails used upon the Stockton and Darlington Railroad, the first complete railroad in the world, which was opened in 1825, were of wrought iron, rolled fish-bellied, with half-lap joints, and weighing 28 pounds per yard: a small portion of the line was laid with cast-iron fish-bellied rails.

The first iron rails of any kind that were made in this country were made of cast iron. Solomon W. Roberts gives us this information concerning them:—"The Lehigh Coal and Navigation Company made a short section of experimental railroad in the summer of 1826, at its foundry at the upper end of the town of Mauch Chunk, and a car was run upon it. The idea then was to make a road with rails and chairs of cast iron, like those in use at the coal mines in the North of England. After casting a good many rails, each about four feet long, the plan was given up on account of its being too expensive."

Many years elapsed after the first railroad was built in this country before iron rails were made in American rolling-mills. Among the proposals to furnish rails for the Columbia and Philadelphia Railroad, received in May, 1831, there were none for American iron, and the whole quantity was purchased in England. Previous to the passage of the tariff act of 1842, rails were admitted into this country virtually free of duty. On the passage of that act some American capitalists began to think about making our own rails.

A few flat rails had been rolled prior to 1842, but such rails were only bar iron. On the Mauch Chunk Railroad, built in 1827, the wooden stringers were strapped with common merchant bar iron, the flat bars being about one inch and a half wide, and three-eighths of an inch thick. The holes for the spikes were drilled by hand. The flat rails which were afterwards made differed from merchant bars of the same size only in this, that the rail in its last passage through the rolls became indented, or countersunk, at regular distances. The centre of the countersunk surface was afterwards punched through for admitting the spike. As late as 1837, when the Erie and Kalamazoo Railroad was in course of construction from Toledo to Adrian, it was proposed to put down wooden rails, of oak studding four inches square, and to draw the cars by horses. But wiser counsels prevailed, and by great exertions sufficient funds were obtained to enable the management to iron the road with strap rails five-eighths of an inch thick. Strap rails continued in use in this country, notwithstanding the introduction of heavier rails, down to about 1850. "It was not until 1850 that the longitudinal sill and the flat rail were entirely removed from the Utica and Schenectady Railroad, the most important link in the New York Central line."

In 1844 the manufacture of heavy iron rails in this country was commenced at the Mount Savage rolling-mill, in Alleghany county, Maryland, erected in 1843 especially for rolling these rails. The first rail rolled at the Mount Savage rolling-mill, and for which the Franklin Institute of Philadelphia struck a silver medal, was a U rail, known in Wales as the Evans patent, of Dowlais ironworks, Merthyr Tydvil. It was intended to be laid on a wooden longitudinal sill, and was fastened to it by an iron wedge, keying under the sill, thus doing away with outside fastenings. This rail weighed 42 lbs. to the yard, and about 500 tons of it were laid in 1844 on a part of the road then being built between Mount Savage and Cumberland, a distance of nine miles. It was understood at the time to be the first heavy railroad iron made in America.

The Montour rolling-mill, at Danville, Pa., was built in 1845 expressly to roll rails, and here were rolled in October of that year the first T rails made in the country. The first T rail rolls made in this country were made for the Montour Iron Company by the firm of Haywood & Snider, proprietors of the Colliery ironworks at Pottsville, the work being done at their branch establishment at Danville. The Boston ironworks were started in January, 1824, to manufacture cut nails, hoops, and tack plates, but they subsequently rolled rails, and on the 6th of May, 1846, they rolled the first T rails in Massachusetts, Ralph Crooker being superintendent. In 1845 the rolling-mill of Cooper & Hewitt was built at Trenton, N. J., to roll heavy rails, and on the 19th of June, 1846, their first rail was rolled. About the 1st of September, 1846, the New England Iron Company, at Providence, Rhode Island, commenced to roll T rails. The first lot of these rails rolled by the company was delivered to the Providence and Worcester Railroad, September 11, 1846. T rails were rolled in November, 1846, at Phœnixville, Pa.; in the fall of the same year at the Great Western ironworks at Brady's Bend, Pa.; early in 1847 at the Bay State rolling-mill, in Massachusetts, then owned by the Massachusetts Iron Company; in January, 1848, at the Rough-and-Ready rolling-mill at Danville, Pa.; and in the same year at Safe Harbor, Pa. All the T rails made at the mills above mentioned were rolled with a base or flange similar to that of the present T rail. A few other mills rolled heavy rails before 1850, but at the beginning of that year, owing to low duties, only two out of fifteen rail-mills in the country were in operation. It has been claimed that heavy rails in this country were first made at Brady's Bend; but this is a mistake, as the dates above fully show. The mill at this place was built in 1841, as a merchant bar mill, and any rails that it may have made prior to the fall of 1846 were flat rails. The first shipment of T rails made by the company was probably in June, 1847, by keel-boat on the Allegheny river to Pittsburgh.

The first T rails imported into this country were made to be fitted into cast-iron chairs, which rested upon stone blocks, but in a few years wooden cross-ties were used instead of the blocks. On the Boston and Lowell Railroad, which was completed in 1835, stone cross-ties were at first laid, some of which were in use as late as 1852. A thin wedge or key of wrought iron was driven between the inside of the chair and the rail, to keep the latter firmly in its place, and the operation of "driving keys" had to be repeated almost every day, owing to the tendency of moving trains to loosen them. Rails of this pattern were used for many years upon the Allegheny Portage Railroad in Pennsylvania, and many of the stone blocks can now be seen in its abandoned bed. A writer on railroads, in *Johnson's Cyclopædia*, states that the first T rails introduced into this country were laid on the New Orleans and Pontchartrain Railroad in 1831. Assuming that the statement is correct, the pattern used was undoubtedly that which we have just described. Rails made with the broad base now found in all T rails are said to have been first made in England about 1836, for the Camden and Amboy Railroad of New Jersey, and the innovation is also said to have been the result of a futile effort to roll a rail and chair in one piece. In a notice of Robert Livingston Stevens, in the *American Cyclopædia*, it is stated that "in 1836 he introduced the T rail on the Camden and Amboy Railroad, of which he was president for many years." The reference here is doubtless to the present form of the T rail. It seems strange that this form of rail should not have become generally popular in this country until many years after 1836.

The first thirty-foot rail rolled in this country is claimed to have been rolled at the Cambria ironworks at Johnstown, Pa., in 1855. These rails were perfectly made, but there being no demand for them they were used in the company's tracks. It is claimed that the first thirty-foot rails rolled in the country on order were rolled at the Montour rolling-mill, in January, 1859, for the Sunbury and Erie Railroad Company. In 1876 one rolling-mill in Pennsylvania, the Cambria ironworks, rolled the largest aggregate of rails ever rolled in one year by one mill in this country. Its production of rails in that year was 103,743 net tons, of which 47,643 tons were iron rails and 56,100 tons were steel rails. Beginning business in 1853, it has since that year manufactured one-tenth of the total product of American rails.

Iron Shipbuilding in the United States.—The business of iron shipbuilding in this country may properly be said to date from the year 1839, when an iron steamboat was built at Pittsburgh, being the first enterprise of the kind in the United States. The vessel was called the *Valley Forge*. For general navigation purposes it was completely successful. Other iron vessels were subsequently built at Pittsburgh which fully realized the hopes of their builders, among them an iron schooner for ocean service, and an iron steamer, the *Michigan*, for service on the lakes—both built by order of the government about

1842. In that year Captain John Ericsson, of New York, furnished designs for four freight propeller iron steamers which were built for the Delaware and Raritan Canal, each 96 feet long, 24 feet beam, and 7 feet deep. In 1843 there were also built after his designs the propeller iron steamer *Legare*, for the revenue service, 150 feet long, 26 feet beam, and 10 feet deep, and four propeller boats for the Erie Canal, each 80 feet long, 14 feet beam, and 6 feet deep. In the same year Captain Ericsson built two steam passenger boats of iron to run on the James River Canal, in Virginia, and about the same time other small iron vessels were built after his designs. In 1846 an iron passenger steamer, the *Iron Witch*, 220 feet long, 27 feet beam, and 13 feet deep, was built at New York, after a design furnished by Captain Ericsson to run on the Hudson river to Albany. About 1844 R. B. Forbes, of Boston, built a powerful iron wrecking vessel of 1,200 tons burden. The building of iron vessels made but slow progress, however, until after 1860.

During the civil war monitors and other iron vessels were built by the government, and Pittsburgh furnished many of the armor-plates which were required for them. The contract for the construction of the first turreted iron-clad vessel in the world, Ericsson's *Monitor*, was made by the United States Navy Department on the 4th of October, 1861, with Captain Ericsson, and on the 9th of March following it met and vanquished the Confederate iron-clad *Merrimack*. The *Monitor* foundered on the 13th of December, 1862, in a storm off Cape Hatteras, the accident being caused by mismanagement of the turret.

The history of the construction of this historic vessel and of other monitors built during the war is worthy of preservation, and we give it as follows in an extract from a letter we have received from Captain Ericsson. We sought in vain for this information in all the histories of the war.

> The *Monitor* was built under contract between the Secretary of the Navy and John Ericsson, whose sureties were John F. Winslow and John A. Griswold of Troy, and C. S. Bushnell of New Haven. The *Monitor* in all its parts was designed by me—hull, turret, steam machinery, anchor-hoister, gun-carriages, etc., all were built from working drawings made by my own hands, furnishing the rare instance of such a structure in all its details emanating from a single person. In carrying out the contract I employed the Novelty ironworks to build the turret; the Delamater ironworks to build the motive-engines, propeller, boilers, turret-gear, anchor-hoister, gun-carriages, and all other machinery; while I employed Thomas F. Rowland, of Greenpoint, to build the hull, attach the side armor, and launch the vessel—a difficult undertaking, which he carried out with much skill. The turret-plating and armor-plating, composed of a series of plates one inch thick, were rolled by H. Abbott & Son, of Baltimore.
>
> Six monitor iron-clads of the Passaic class, viz., the *Passaic, Montauk, Catskill, Patapsco, Sangamon,* and *Lehigh,* were also built under contract between the Secretary of the Navy and myself, the sureties being the gentlemen already mentioned. Of these six vessels, three were built in New York and three on the Delaware. I

also built, under direct contract with the Secretary of the Navy, the large monitor iron-clads, *Dictator* and *Puritan*, the hull of the latter being built by Thomas F. Rowland, at Greenpoint, while the hull of the *Dictator* was built in New York by the Delamater ironworks. This establishment also built the turret and furnished the entire machinery for both vessels, likewise from working drawings prepared by me. Four other monitor iron-clads of the Passaic class were also built by other parties, viz., *Weehawken* and *Camanche*, built at Jersey City, and the *Nahant* and *Nantucket* at Boston. The working drawings were, however, furnished by myself. The entire armor-plating and nearly the whole of the hull-plating of the several monitor iron-clads built by me were rolled by H. Abbott & Son, of Baltimore. The heavy forgings employed in constructing the turrets and steam machinery of the foregoing iron-clads were furnished by the Bridgewater ironworks, of Massachusetts.

The following monitor iron-clads were also built after my plans: *Catawba* and *Oneota*, built at Niles Works, Cincinnati; *Tippecanoe*, built by Miles Greenwood, Cincinnati; *Mahopac* and *Tecumseh*, built by Secor & Co., Jersey City; *Manhattan*, by Perine, Secor & Co., Jersey City; *Canonicus*, by Harrison Loring, Boston, Mass.; *Manayunk*, by Snowden & Mason, Pittsburgh; *Saugus*, by Harlan & Hollingsworth, Wilmington, Del.

Among the iron vessels additional to the monitors which were built during the war may be mentioned the *New Ironsides* and the *Dunderberg*, the armor-plates for which were rolled by Brown & Co., of Pittsburgh.

In 1868 five iron steamships were built for ocean service. Since that year over two hundred iron vessels have been built in this country, and of these Pennsylvania has furnished the largest tonnage. The total tonnage of all the vessels built up to the beginning of 1877 is officially stated to be 197,500, the whole number of vessels being 251. Of these, 61 were rated from 1,000 to 2,000 tons; 9 from 2,000 to 3,000 tons; 8 from 3,000 to 4,000 tons; and 2 over 5,000 tons; the remaining 171 were under 1,000 tons. One firm, that of John Roach & Son, at Chester, Pa., has built 33 iron steamers since 1872, having a total tonnage of 68,150. The same firm has in the same time paid $14,890,000 for materials and labor.

Some of the finest iron steamships the world has yet seen have been built on the Delaware. The only line of passenger steamships plying between this country and Europe which is wholly owned by Americans, and carries the American flag, is the American Steamship Company's line, composed of four magnificent iron vessels, the *Pennsylvania*, *Ohio*, *Indiana*, and *Illinois*, built at Philadelphia of Pennsylvania iron by Cramp & Sons, and running regularly between that port and Liverpool. No finer passenger vessels plow the Atlantic. Their length is 355 feet, breadth of beam, 43 feet, and depth of hold, 33 feet. They can accommodate 76 first-class passengers, and about 800 intermediate and steerage passengers. Their tonnage capacity is 3,100 tons each; capacity of coal-bunkers, 720 tons each. Most of the European visitors to the Centennial Exhibition came to Philadelphia and returned to their homes in the vessels of this line. They have made so favorable an impression on the English underwriters that they have been accorded a rate of insurance lower than that of any other steamers in the Transatlantic trade, except two of the Cunard ships, and these two pay the same rate as the American line.

In 1874 John Roach & Son built at Chester, Pa., for the Pacific Mail Steamship Company, two iron steamships of immense size and superior equipment, which fully equal in all respects the best of British-built iron steamers. These were the *City of Peking* and the *City of Tokio*—twin vessels in every respect. Their registered tonnage is 5,000 tons each. Each ship will accommodate 150 cabin passengers and 1,800 steerage passengers, and each vessel's coal-bunkers will carry 1,500 tons. The total weight of iron used in constructing each steamship was 5,400,000 pounds, and the cost of each was over $1,000,000 The cost of building iron steamships on the Delaware is now as low as vessels of equal excellence can be built on the Clyde. In addition to the firms above named, the Harlan & Hollingsworth Company, and Pusey, Jones & Co., of Wilmington, Delaware, have extensive iron shipyards, and have built many iron vessels for ocean service. Up to 1876, owing to the popularity of iron steamships, only one iron sailing ship had been built in the United States. The statement that iron vessels can be built as cheaply in this country as abroad has attracted wide attention, and an increase in the orders for their construction may be speedily expected to follow.

Exports of Pennsylvania Iron Before the Revolution.—The exportation of pig iron from the colonies to Great Britain began in the years 1728–9, according to the most reliable records. In those years the colonies exported to England 1,156 tons, of which Pennsylvania contributed 274 tons. From 1728–9 to 1755 the exports to England from the iron-producing colonies aggregated 57,404 tons, including shipments to Scotland. Of this total, Pennsylvania shipped 4,604 tons. The exportation of bar iron from America began in 1717, when 2 tons of bars were sent to England from the British West India Islands of Nevis and St. Christopher, but which had evidently been taken there from the colonies. In 1718, 3 tons and 7 cwt. of bars were shipped from Virginia and Maryland to England. In 1735 Pennsylvania exported 10 tons, 17 cwt., and 3 qrs. of bar iron. From 1735 to 1755 the total exports of bar iron from the colonies to England and Scotland were 1,430 tons, of which Pennsylvania's share was 416 tons. From 1761 to 1776 the colonies exported 54,453 tons of pig iron and 18,723 tons of bar iron to England, of which the quantity exported by Pennsylvania can not now be ascertained. The amount of iron exported from Philadelphia in the year ending April 5, 1766, was 882 tons of bar iron at £26 per ton, and 813 tons of pig iron at £7 10s. per ton. In the three years preceding the war, ending January 5, 1774, the total exports from Pennsylvania were respectively 2,358, 2,205, and 1,564 tons. The proportions of pig and bar iron are not stated.

The above figures represent only colonial shipments of iron to the mother country, and no other export figures are obtainable. But it is known that the colonies also exported iron to the West Indies, in exchange for West India products, some of which iron found its way to the mother country, as we have seen above. Some of the colonies also exported iron to sister colonies. All of the colonies were prohibited, by acts of Parliament, from exporting their products to any foreign country except Great Britain. In 1756 Acrelius, the Swedish historian, wrote as follows:

> Pennsylvania, in regard to its ironworks, is the most advanced of all the American colonies. When New Jersey is added to it, one can safely say that from the Delaware the greatest part of the iron in America is taken. Herewith, however, the provinces of Maryland, Virginia, and New York deserve to be mentioned. . . . Pennsylvania, New Jersey, and Maryland supply more iron than their inhabitants need. From Maryland some pig iron is carried to Philadelphia in exchange for West India goods, as Maryland has but little commerce with the Islands, and no other offset against Philadelphia. The export is made to London, the West India Islands, and other English colonies on the continent of America.

British Measures to Prevent the Manufacture of Iron and Steel in the United States.—In 1749 an act of the British Parliament was passed which encouraged the importation of American pig and bar iron into Great Britain by repealing the duties thereon, the object being to aid in the development of the finished iron trade of the mother country by supplying it with cheap raw iron, and to stimulate the exportation of woolen and other British manufactures to the colonies in exchange for their iron. The act did not contemplate the encouragement of finished iron manufactures in the colonies, but just the reverse, for it provided as follows:

> "That from and after the twenty-fourth day of June, 1750, no mill or other engine for slitting or rolling of iron, or any plating forge to work with a tilt-hammer, or any furnace for making steel, shall be erected, or, after such erection, continued in any of His Majesty's colonies in America; and if any person or persons shall erect, or cause to be erected, or, after such erection, continue, or cause to be continued, in any of the said colonies, any such mill, engine, forge, or furnace, every person or persons so offending shall, for every such mill, engine, forge, or furnace, forfeit the sum of two hundred pounds of lawful money of Great Britain." And further: "That every such mill, engine, forge, or furnace so erected or continued, contrary to the directions of this act, shall be deemed a *common nuisance*," to be abated by "every governor, lieutenant-governor, or commander-in-chief of any of His Majesty's colonies in America, where any such mill, engine, forge, or furnace shall be erected or continued."

This oppressive and tyrannical act *was enforced*. In Pennsylvania the Lieutenant-Governor, James Hamilton, Esq., issued a proclamation, dated August 16, 1750, commanding the owners of every rolling and slitting mill, plating forge, and steel furnace in the province to appear before him, on or before the following 21st day of September, with "sufficient proofs whether the said mills, engines, forges, and furnaces respectively were used on the said 24th day of June, or not;" also commanding the sheriffs of all the counties in the province to furnish lists, on or before the 21st of September, of all such establishments within their respective jurisdictions, and to certify "whether they or any of them were used on the said 24th day of June, or not, as they and each of them will answer the contrary at their peril." Responses to this proclamation were made, and are preserved. We have been shown in the library of the Historical Society of Pennsylvania an original copy of the proclamation, which was printed by Benjamin Franklin. In 1756, six years after this proclamation was issued, Acrelius stated that the Vincent steel works were not then in operation, and he afterwards added: "No one is allowed to make nails. The trip-hammers which were erected some years since were condemned on account of their interference with the importation from England."

The enactment of this law, which will forever remain a stain upon the good name of the British people, was only one of a series of oppressive measures which eventually led to independence. They all interfered with the development of the manufactures of this country, the act from which we have quoted exercising a depressing effect upon the iron industry of Pennsylvania and other colonies down to the Revolution.

When the war of the Revolution was over, and the political independence of the United States was secured, Great Britain still sought, by means of restrictive measures, already enacted or specially devised, to prevent the industrial development of this country, so that its people might continue to be dependent upon the mother country for many crude and manufactured articles which, with proper encouragement from their own government, they could themselves produce. These restrictive measures, it is true, applied to other countries as well as to the United States, but upon no other country did they operate with such oppressive influence as upon this country. Skilled mechanics were prohibited from emigrating from Great Britain to other countries, and the exportation of tools or utensils used in the silk, linen, cotton, or woolen manufacture was also prohibited—the penalties in both cases being severe. In 1785 the emigration from Great Britain of iron and steel artificers and workmen and the exportation of tools used in the manufacture of iron and steel were specifically prohibited, and in 1795 the prohibition of the exportation of tools and machinery used in the manufacture of iron and steel was re-affirmed with emphasis. In the same act the prohibition of the exportation of tools and machinery was extended to other manufactures. The restrictions upon mechanics were not wholly repealed until 1825, and the exportation of machinery for manufacturing was not relieved of all restrictions until 1842. The alien efforts that have been made to control the legislation of this country in the interest of British manufacturers are well known and need not be recited. They have been more or less successful until this day, and but for the courage and patriotism of Pennsylvania ironmasters, who have steadily opposed them, they would have been completely so, and the manufacturing and all the other industries of the country would have failed of the magnificent achievements that astonished the world at the close of the first century of our national existence.

POST 58, G.A.R.

Statistics of the Production of Iron and Steel in 1810.—In 1814 there was published *A Statement of the Arts and Manufactures of the United States of America*, as they existed in 1810, prepared by Tench Coxe, under the authority of Albert Gallatin, Secretary of the Treasury. From this document we glean the following information concerning the condition of the iron industry of Pennsylvania and of the country at large in 1810. In the totals for the United States we believe the values to be correct, as they include returns from every State, but some of the quantities given are not strictly accurate, because some of the States did not report quantities, although at the same time they reported values. We believe, however, that the quantities are approximately correct.

Number of Blast Furnaces in U. S.,	153;	in Pennsylvania,	44
Number of Air Furnaces in U. S.,		in Pennsylvania,	6
Tons of Cast Iron made in U. S.	53,908;	in Pennsylvania,	26,878
Value of Cast Iron made in U. S.	$2,981,277;	in Pennsylvania,	$1,301,343
Number of Bloomaries in U. S.	135;	in Pennsylvania,	4
Tons of Iron made in U. S.	2,564;	in Pennsylvania,	....
Value of Iron made in U. S.	$226,034;	in Pennsylvania,	$16,000
Number of Forges in U. S.	330;	in Pennsylvania,	78
Tons Bar Iron, etc., made in U. S	24,541;	in Pennsylvania,	10,969
Value of Bar Iron, etc., made in U. S.	$2,874,063;	in Pennsylvania,	$1,156,405
Number of Trip Hammers in U. S.	316;	in Pennsylvania,	50
Product of Trip Hammers in tons	600;	in Pennsylvania,	....
Value of Product of Trip Hammers	$327,898;	in Pennsylvania,	$73,496
Rolling and Slitting Mills in U. S.	34;	in Pennsylvania,	18
Tons of Rolled Iron made in U. S.,	9,280;	in Pennsylvania,	4,502
Product in Tons of Slit Iron in U. S.,		in Pennsylvania,	98
Value of Rolled and Slit Iron in U. S.	$1,215,946;	in Pennsylvania,	$606,426
Number of Naileries in U. S.	410;	in Pennsylvania,	175
Pounds of Nails made in U. S.	15,727,914;	in Pennsylvania,	7,270,825
Value of Nails made in U. S.	$2,478,139;	in Pennsylvania,	$760,862

The product of Steel Furnaces in Massachusetts, Rhode Island, New Jersey, Pennsylvania, Virginia, and South Carolina was 917 tons, valued at $144,736. Of the whole number of Steel Furnaces, Pennsylvania contained 5, of which Philadelphia City, and Philadelphia, Lancaster, Dauphin and Fayette counties each contained one. The product of Pennsylvania was 531 tons, valued at $81,147.

The following-named counties in Pennsylvania produced the iron accredited in this table to this State: Philadelphia, Montgomery, Bucks, Northampton, Delaware, Chester, Lancaster, Dauphin, Berks, Luzerne, Northumberland, Lycoming, Erie, Armstrong, Centre, Mifflin, Cumberland, York, Adams, Franklin, Bedford, Huntingdon, Cambria, Fayette, Westmoreland, Washington, Beaver, Butler, Allegheny, Mercer, and Crawford: thirty-one counties in all.

Statistics of the Production of Iron and Steel after 1810, and down to 1870.—In 1820 the value of all the manufactures of pig iron and castings in the United States was $2,230,275, of which Pennsylvania produced $563,810 worth. In the same year the country produced "manufactures of wrought iron" to the amount of $4,640,669, of which Pennsylvania's share was $1,156,266.

In 1830 the value of the pig iron and castings manufactured in the United States was $4,757,403, of which the share of Pennsylvania was $1,643,702. In the same year the country's production of "manufactures of wrought iron" amounted in value to $16,737,251, of which Pennsylvania produced $3,762,847 worth.

In 1840 there were in the United States 804 furnaces, which produced in that year 286,903 tons of "cast iron." Pennsylvania had 213 furnaces, and produced 98,395 tons of "cast iron." In the same year there were 795 bloomaries, forges, and rolling-mills in the country, of which Pennsylvania had 169. The number of tons of bar iron produced in that year was 197,233, of which Pennsylvania's share was 87,244.

In 1828 Pennsylvania had 44 blast furnaces, and 78 forges and rolling-mills, and produced 24,822 tons of pig iron; in 1830 the figures were, respectively, 45, 84, and 31,056. Gordon in 1832 claimed about 60 furnaces and a production of 50,000 tons of cast iron and 40,000 tons of bar iron. In 1842 there were 213 blast furnaces in the State, 169 forges and rolling-mills, and 151,885 tons of pig iron were produced. The production of pig iron in the State in 1843 was 190,000 tons, and in 1844 it was 246,000 tons. In 1846 there were 317 blast furnaces in the State, producing 368,056 tons of pig iron, and in 1847 there were the same number of blast furnaces, producing 389,350 tons of pig iron. In 1849 the pig iron product of the State fell to 253,000 tons. In 1850 there were in Pennsylvania 57 anthracite coal furnaces, 7 bituminous coal furnaces, 4 coke furnaces, 85 hot-blast charcoal furnaces, 145 cold-blast charcoal furnaces, and 6 bloomaries: total, 304 furnaces and bloomaries.

In 1850 there were produced in the United States 563,755 tons of pig iron by 377 establishments, of which Pennsylvania produced 285,702 tons of pig iron in 180 establishments. In the same year the country produced wrought iron manufactures to the amount of $22,629,271 in 552 establishments, of which Pennsylvania produced $9,224,256 worth in 162 establishments.

In 1860 the United States, in 97 establishments, produced 51,290 tons of blooms, worth $2,623,178; Pennsylvania, in 57 establishments, produced 24,700 tons of blooms, worth $1,467,450. In the same year the United States, in 286 establishments, produced 987,559 tons of pig iron, worth $20,870,120; Pennsylvania, in 125 establishments, produced 580,049 tons of pig iron, worth $11,262,974. In 256 establishments, the United States produced 513,213 tons of rolled iron, worth $31,888,705; Pennsylvania, in 87 establishments, produced 266,253 tons of rolled iron, worth $15,122,842. In 13 establishments the United States produced 11,838 tons of steel, worth $1,778,240; Pennsylvania, in 9 establishments, produced 9,890 tons of steel, worth $1,338,200.

In 1870 the United States, in 82 establishments, produced 110,808 tons of blooms, worth $7,647,054; Pennsylvania, in 43 establishments, produced 68,238 tons of blooms, worth $4,881,431. In 386 establishments the United States produced 2,052,821 tons of pig iron, worth $69,640,498; Pennsylvania, in 136 establishments, produced 1,033,272 tons of pig iron, worth $32,636,410. In 310 establishments the United States produced 1,468 312 tons of rolled iron, worth $120,311,-158; Pennsylvania, in 120 establishments, produced 713,331 tons of rolled iron, worth $56,811,975. In 2 establishments the United States produced 19,403 tons of Bessemer steel, worth $1,818,220; Pennsylvania, in 1 establishment, produced 13,500 tons of Bessemer steel, worth $1,405,000. In 28 establishments, not including Bessemer steel works, the United States produced 30,354 tons of steel, worth $7,791,-766; Pennsylvania, in 17 establishments, produced 21,806 tons of steel, worth $5,560,238.

Statistics of the Production of Iron and Steel in 1876.—In 1876 the United States, in 39 forges, produced 20,784 net tons of blooms and billets from the ore, and in 59 bloomaries produced 23,844 net tons of blooms from pig and scrap iron: total, 98 forges and bloomaries, producing 44,628 net tons of blooms and billets of all kinds. Pennsylvania, in 39 bloomaries, produced 13,401 net tons of blooms from pig and scrap iron, and none from the ore. In 714 blast furnaces the United States produced 990,009 net tons of bituminous coal and coke pig iron, 794,578 net tons of anthracite pig iron, and 308,649 net tons of charcoal pig iron: total production, 2,093,236 net tons of pig iron. It is proper to state, however, that in 1876, in consequence of the panic of 1873, only a part of the ironworks of the United States were in operation. Pennsylvania, in 279 blast furnaces, produced 588,829 net tons of anthracite pig iron, 397,685 net tons of bituminous coal and coke pig iron, and 23,099 net tons of charcoal pig iron: total production, 1,009,613 net tons of pig iron. Of this total, the Lehigh valley produced 261,274 net tons; the Schuylkill valley, 144,969 net tons; the Upper Susquehanna district, 79,217 net tons; the Lower Susquehanna district, 103,369 net tons; the Shenango valley, 138,495 net tons; Pittsburgh and Allegheny county, 128,555 net tons. The bituminous coal and coke pig iron made in parts of the State outside of Allegheny county and the Shenango valley amounted to 130,635 net tons.

In the United States in 1876 there were 338 rolling-mills, containing 4,488 single puddling furnaces, counting each double furnace as two single ones. Of these, 98 were built to make rails—60 heavy and 38 light rails—and 64 included cut-nail factories. The total production of rolled iron was 1,921,730 net tons, classified as follows: bar, angle, bolt, rod, and hoop iron, 668,956 net tons; plate and sheet iron, 165,255 net tons; cut nails and spikes, 207,890 net tons, or 4,157,814 kegs of 100 pounds each; and rails, 879,629 net tons, of which 412,461 net tons were Bessemer steel rails, and 467,168 net tons were iron and all other kinds. In Pennsylvania in 1876 there were 137 rolling-mills, containing 2,153 single puddling furnaces, counting each double furnace as two single ones. Of these, 35 were built to make rails—20 heavy and 15 light rails—and 25 included cut-nail factories. The total production of rolled iron in the State was 824,260 net tons, classified as follows: bar, angle, bolt, rod, and hoop iron, 301,350 net tons; plate and sheet iron, 100,576 net tons; cut nails and spikes, 68,409 net tons, of 1,368,163 kegs of 100 pounds each; and rails, 353,925 net tons, of which 203,750 net tons were Bessemer steel rails, and 150,175 net tons were iron and all other kinds.

In the United States there were 11 Bessemer steel establishments, which produced 525,996 net tons of ingots and rolled 412,461 net tons of rails, consuming 539,474 net tons of pig iron, of which 45,980 net tons were spiegeleisen. In Pennsylvania there were 5 Bessemer steel establishments, which produced 258,452 net tons of ingots and rolled 203,750 net tons of rails, consuming 260,487 net tons of pig iron, of which 25,180 net tons were spiegeleisen.

In 60 establishments, only 47 of which were active, however, the United States produced 71,178 net tons of puddled, open-hearth, blister, and crucible steel, of which 39,382 net tons were crucible steel, 21,490 net tons were open-hearth steel, and 10,306 net tons were puddled and blister steel. Including 525,996 net tons of Bessemer steel ingots, the total production of steel of all kinds in the United States in 1876 was 597,174 net tons. In 24 establishments Pennsylvania produced 43,365 net tons of puddled, open-hearth, blister, and crucible steel, of which 28,217 net tons were crucible steel, 7,547 net tons were open-hearth steel, and 7,601 net tons were puddled and blister steel. Including 258,452 net tons of Bessemer steel ingots, the total production of steel of all kinds in Pennsylvania in 1876 was 301,817 net tons.

The average price per gross ton in Philadelphia in 1876 of No. 1 anthracite foundry pig iron was $22.25. The average price per gross ton in Philadelphia of American iron rails was $41.25. The average price per gross ton of American Bessemer steel rails at the works in

Pennsylvania was $52. The average price per gross ton of American best refined rolled bar iron in Philadelphia was $49.28.

The following named counties in Pennsylvania contained iron or steel-making establishments in 1876, which were either in operation in that year or were ready to be put into operation:—Adams, Allegheny, Armstrong, Beaver, Bedford, Berks, Blair, Bradford, Bucks, Cambria, Carbon, Centre, Chester, Clarion, Clinton, Columbia, Cumberland, Dauphin, Delaware, Erie, Fayette, Franklin, Huntingdon, Lancaster, Lawrence, Lebanon, Lehigh, Luzerne, Lycoming, Mercer, Mifflin, Montgomery, Montour, Northampton, Northumberland, Perry, Philadelphia, Schuylkill, Tioga, Union, Westmoreland, and York: total, 42 counties. The counties containing no iron or steel-making establishments in 1876 were as follows:—Butler, Cameron, Clearfield, Crawford, Elk, Forest, Fulton, Greene, Indiana, Jefferson, Juniata, McKean, Monroe, Pike, Potter, Snyder, Somerset, Sullivan, Susquehanna, Venango, Warren, Washington, Wayne, and Wyoming: total, 24 counties.

Comparative Statement by Counties of Pennsylvania Ironworks in 1850 and 1876.—The following table shows the number of iron and steel works existing in Pennsylvania in 1850 and 1876, with the names of the counties in which they were situated:

COUNTIES.	Blast Furnaces.		Forges.		Rolling Mills & Steel Works.		COUNTIES.	Blast Furnaces.		Forges		Rolling Mills & Steel Works.	
	1850	1876	1850	1876	1850	1876		1850	1876	1850	1876	1850	1876
Adams	1	1	0	0	0	0	Indiana	4	0	1	0	0	0
Allegheny	0	11	0	1	16	43	Lancaster	16	15	12	2	2	6
Armstrong	16	8	0	0	2	3	Lawrence	2	10	0	0	2	3
Beaver	0	0	0	0	0	1	Lebanon	6	10	3	3	0	2
Bedford	3	3	3	0	0	0	Lehigh	9	28	0	0	0	3
Berks	13	27	23	4	5	10	Luzerne	5	5	1	0	2	1
Blair	12	14	14	5	1	4	Lycoming	3	1	3	0	2	2
Bradford	0	0	0	0	0	1	Mercer	16	23	0	0	0	6
Bucks	2	1	0	0	0	1	Mifflin	5	3	2	1	0	2
Butler	6	0	0	0	0	0	Monroe	0	0	1	0	0	0
Cambria	6	6	0	0	0	1	Montgomery	6	15	2	0	4	9
Carbon	4	4	6	0	0	1	Montour	0	7	0	0	0	4
Centre	10	6	5	3	5	4	Northampton	4	18	1	0	1	3
Chester	5	4	6	6	14	9	Northumberland	3	2	1	0	0	3
Clarion	29	3	1	0	0	0	Perry	5	3	1	2	1	1
Clearfield	1	0	0	0	0	0	Philadelphia	0	1	3	0	8	14
Clinton	5	1	1	1	0	0	Schuylkill	5	9	6	1	1	6
Columbia	16	3	1	1	3	1	Somerset	3	0	1	0	0	0
Cumberland	7	3	4	2	1	1	Tioga	1	1	0	0	1	0
Dauphin	6	12	2	1	1	5	Union	3	2	1	0	0	0
Delaware	0	0	0	0	1	2	Venango	20	0	0	0	1	0
Erie	1	1	0	0	0	1	Westmoreland	6	1	0	0	0	1
Fayette	5	5	0	0	2	1	York	5	2	3	1	0	1
Franklin	8	4	8	1	1	0							
Huntingdon	15	6	11	4	2	0	Total	298	279	127	39	79	156

Table of States and Territories containing Iron and Steel Works in 1876, with their Production, showing the Position of Pennsylvania.—In the following table is presented a statement showing the number of iron and steel works in 1876 in each of the United States and Territories which made iron or steel in that year, together with the quantity of iron and steel produced by each State or Territory. The position of Pennsylvania in the list is so prominent that further attention need not be called to it.

STATES	Number of Iron and Steel Works in 1876.			Production of Iron and Steel in 1876, in net tons.		
	Blast Furnaces	Rolling Mills.	Steel Works, includ'g Bessemer	Pig Iron.	Rolled Iron of all kinds.	Steel, includ'g Bessemer Ingots.
Maine	1	2	0	3,002	10,814	0
New Hampshire	0	1	1	0	1,900	1,000
Vermont	2	1	0	550	9,183	0
Massachusetts	6	22	4	5,040	78,576	5,085
Rhode Island	0	2	1	0	7,394	0
Connecticut	10	7	4	10,160	10,114	1,098
New York	57	23	4	181,620	130,707	35,859
New Jersey	18	17	8	25,349	52,411	7,458
Pennsylvania	279	137	29	1,009,613	824,260	301,817
Delaware	0	8	0	0	17,598	0
Maryland	24	5	1	19,876	31,181	470
Virginia	33	5	0	13,046	17,306	0
North Carolina	8	0	0	400	0	0
Georgia	11	2	0	10,518	12,001	0
Alabama	13	1	0	24,732	1,000	0
Texas	1	0	0	426	0	0
West Virginia	12	8	0	41,165	49,636	0
Kentucky	23	10	2	34,686	30,874	0
Tennessee	24	5	1	24,585	23,274	5
Ohio	100	48	8	403,277	249,328	59,936
Indiana	9	10	0	14,547	55,262	0
Illinois	12	10	5	54,168	191,421	171,963
Michigan	34	3	0	95,177	5,325	0
Wisconsin	14	1	0	51,261	29,980	0
Minnesota	1	0	0	0	0	0
Missouri	19	6	1	68,223	39,693	12,483
Kansas	0	2	0	0	14,707	0
Oregon	1	0	0	1,750	0	0
California	0	1	0	0	15,465	0
Utah Territory	2	0	0	65	0	0
Wyoming Territory	0	1	0	0	12,320	0
Total	714	338	69	2,093,236	1,921,730	597,174

It is proper to state that the 338 rolling-mills above enumerated include 19 works which both roll iron and make cast steel, one establishment which makes open-hearth steel and Bessemer steel, one which makes open-hearth steel and Bessemer steel and rolls iron, and 8 which both roll iron and make Bessemer steel. All these establishments which make steel, and the Bessemer one which makes nothing but steel, are included in the column of steel works. The total production of rolled iron, 1,921,730 net tons, includes 412,461 net tons of Bessemer steel rails. The ingots of which these rails were made are also included in the column giving the total product of all kinds of steel. We have made the best analysis of the nature and extent of the iron enterprises of the country in 1876 that was possible under the circumstances.

Conclusion.—Such is a brief sketch of the progress of ironmaking in Pennsylvania down to the close of the first century of our national existence in the year 1876. If we have seemed to give undue prominence to the iron enterprises of some sections of the State, and to give to others less prominence than they deserve, the explanation is that in the one case we have had ample information and in the other case all desirable information could not be obtained. All apparently unnecessary details have been discarded, and due diligence has been exercised in seeking for valuable facts that were hard to find. The statistics we have given are reliable.

The development of the iron industry of Pennsylvania has kept pace with the progress made in the settlement of the State. It commenced in the Schuylkill valley, forty miles from Philadelphia, and soon after extended to the northward and southward of the city, and to the westward into Lancaster county. As the Indians retired but slowly, many years elapsed after Philadelphia was founded before the interior of the State was settled even by pioneers, and it was not until after the Revolution—a hundred years from the time when Penn sailed up the Delaware—that iron was made as far westward as the Juniata valley. But settlements in the extreme western and southwestern parts of the State were made almost simultaneously with those in the Juniata valley, and we find that iron was made in Fayette and Westmoreland counties about the same time that it was made within its boundaries. In the Susquehanna and Allegheny valleys iron was made soon after the tide of immigration rolled over their borders. Pittsburgh early became noted for its iron enterprises, although iron ore was not found in its immediate vicinity. Wherever the adventurous Pennsylvanians went, the iron business took root if there was the least encouragement to establish it. Their furnaces and forges, and afterwards their rolling-mills, were conducted with as much skill and with as satisfactory results as characterized like establishments in the Old World. They showed themselves to be enterprising and progressively scientific ironmakers, so that at the beginning of the second half of the last century the State was far in advance of any other in the extent and variety of its iron manufactures—a position which has been steadily strengthened until this day, and which for generations to come it must continue to hold. Not only this, but Pennsylvania enterprise and capital have aided largely in establishing the iron manufacture in other States and Territories. But for the part taken by Pennsylvanians toward the middle of the last century, the iron industry of New Jersey would not have had an early and a healthy growth. But for their example and substantial assistance, the iron industry of the West and South would not have prospered as it has. But for their courage in resisting the arrogant trade pretensions of Great Britain, our own government would have withheld the encouragement that was necessary to the development of the iron industry of the whole country.

There are many features of the iron history of Pennsylvania which are not only curious but startling. But for the thinning of its dense forests to supply charcoal for its forges and furnaces, the agriculture of the State would have lagged behind, from lack of tillable land as well as from lack of purchasers of agricultural products. But for the building of forges and furnaces and rolling-mills which followed closely upon the building of pioneer cabins, the turnpikes and canals and railroads of the State would not so soon have become a necessity, for it is a remarkable fact that the making of iron preceded all of them The forgeman and the furnaceman of Pennsylvania have never been far in the rear of the pioneer with his rifle. But for the great progress made in the manufacture of iron with charcoal in Pennsylvania, the way would not have been opened for the magnificent development of the coal fields of the State. The changes that have taken place in the iron manufacture of the State within the memory of men who are yet young astonish us by their magnitude. Down to about 1840 all the iron in the State was made with charcoal: now far less iron is made with charcoal than with any other fuel. Down to about 1835, in addition to making pig iron, many of the furnaces in the State cast stoves, pots, kettles, andirons, sadirons, railroad chairs, and other articles as a regular business: now none of them do. Down to about 1830 very little iron in the State was rolled; nearly all was hammered at the forges: now no bar iron is made at the forges and but little of any other shape. The first iron made in the State was made in bloomaries: in 1810 but four of these were left, and long before 1876 the last one had disappeared. The introduction of the Bessemer and Siemens-Martin processes into the State, and into the country, dates since the close of the civil war, and the cast-steel industry of the State and country scarcely had an existence when the war commenced. As late as 1850 the furnace that would make fifty tons of pig iron a week with any kind of fuel was doing good work: now there are many furnaces in the State that make that much iron in a day, while a few can make seventy-five tons a day as a regular product, and two of these have made a hundred tons a day as the result of special effort. The changes that we have noted and others that might be mentioned have not been the result of accident nor the creation of necessity, but have resulted from the enterprise and skill of Pennsylvanians—a people who were not born to wait, with halting steps and timid hearts—with no touch of inspiration and no whisper of destiny, for others to lead where they could follow.

A COMPLETE LIST

OF THE

IRONWORKS OF PENNSYLVANIA,

AT THE BEGINNING OF 1876.

BLAST FURNACES.

ANTHRACITE—LEHIGH VALLEY.

Allentown Iron Works, Allentown Iron Co., Allentown, Lehigh county. Office, 230 South Third Street, Philadelphia. Five stacks: one 45 x 12, one 45 x 14, two 52 x 16, and one 60 x 17, built in 1846, 1847, 1852, 1855, and 1872, respectively; total weekly capacity, 1,050 net tons; annual capacity, 54,600 tons.

Allentown Rolling Mill Co., Allentown. Office, 303 Walnut Street, Philadelphia. Two stacks, each 68 x 15, built in 1864; open tops; annual capacity, 20,000 net tons. Formerly owned by Roberts Iron Co. *See Rolling Mills.*

Bethlehem Iron Works, Bethlehem Iron Co., Bethlehem, Northampton county. Six stacks, built in 1863, 1867, 1868, 1874, and 1875; dimensions, 62 ft. 5 in. x 15 ft., 45 x 15, 50 x 14 ft. 5 in., $31\frac{1}{2}$ x $10\frac{3}{4}$, 70 x 18, and 70 x 18. The fourth furnace, $31\frac{1}{2}$ x $10\frac{3}{4}$, makes spiegeleisen, and was first put in blast August 4, 1875. *See Rolling Mills.*

Carbon Iron Works, Carbon Iron Co., Parryville, Carbon county. Three stacks, 52 x 12, 52 x 16, and 65 x 18, built in 1855, 1864 and 1869, respectively; one open and two closed tops; total annual capacity, 34,000 net tons. Dennis Bauman, President and Manager, and Alexander W. Butler, Secretary.

Coleraine Iron Works, W. T. Carter & Co., Redington, Northampton county. Office, 103 Walnut Street, Philadelphia. Two stacks, each 60 x 17, built in 1869 and 1872; combined weekly capacity, 500 net tons; annual capacity, 26,000 tons. *See Tamaqua Rolling Mill.*

Crane Iron Works, Crane Iron Co., Catasauqua, Lehigh county. Office, 224 South Fourth Street, Philadelphia. Six stacks, 45 x 11, 45 x 13, 55 x 16, 55 x $17\frac{1}{2}$, 55 x $17\frac{1}{2}$, and 60 x $17\frac{1}{2}$, built in 1840, 1842, 1846, 1850, 1850, and 1867, respectively; open tops; total annual capacity, 60,000 net tons. Geo. A. Wood, President; Geo. T. Barns, Secretary; B. J. Leedom, Treasurer, and Joshua Hunt, Superintendent.

Durham Iron Works, Cooper, Hewitt & Co., Riegelsville, Bucks county. Office, 17 Burling Slip, New York. One stack, 76 x 20, built in 1874. The two old stacks, 48 x 13 and 50 x 15, built in 1848 and 1851, have been torn down and will not be rebuilt.

Emaus Furnace, C. H. Nimson, lessee, Allentown. Lehigh county. One stack, 70 x 16; first put in blast Oct. 10, 1872. Owned by Emaus Iron Co.

Glendon Iron Works, Glendon Iron Co., Easton, Northampton county. Five stacks, 50 x 12, 48 x 14, 50 x 15, 63 x 16, and 72 x 18, built in 1843, 1844, 1850, 1852, and 1869, respectively. No. 1 was rebuilt in 1849. These furnaces are at Glendon, near Easton, except No. 4, which is situated at South Easton. No. 2 and No. 4 are blown by water-power. All closed tops except No. 2. Total annual capacity, 53,000 net tons. Wm. Firmstone, Superintendent. General office, Boston, Mass.

Keystone Furnace, Keystone Iron Co., Easton, Northampton county. One stack, 65 x 16; annual capacity, 10,000 net tons; blown in April 17, 1876. E. H. Green, President, and Kenneth Robertson, Superintendent. Furnace near Glendon.

Lehigh Iron Works, Lehigh Iron Co., Allentown, Lehigh county. Two stacks, 55 x 16 and 60 x 17; No. 1 completed July 22, 1869, and No. 2, Oct. 21, 1872; total annual capacity, 21,000 net tons. W. H. Ainey, President, and L. R. Unger, Secretary.

Lehigh Valley Iron Works, Lehigh Valley Iron Co., Coplay, Lehigh county. Three stacks, 60 x 14, 55 x 16, and 55 x 16, built in 1853, 1862, and 1868, respectively; open tops; total annual capacity, 30,000 net tons. Joseph Laubach, President, and B. S. Levan, Secretary and Manager.

Lock Ridge Furnaces, Thomas Iron Co., Alburtis, Lehigh county. Two stacks, each 55 x 15, built in 1867 and 1869. *See Thomas Iron Works.*

Millerstown Iron Co., Macungie, Lehigh county. One stack, 56 x 16, completed in 1874, and blown in Sept. 14, 1874; annual capacity, 10,500 net tons. V. W. Weaver, Superintendent.

Northampton Furnace, Northampton Iron Co., Freemansburg, Northampton county. Office at South Bethlehem. One stack, 65 x 16, built in 1872; put in blast July 18, 1873; closed top; annual capacity, 10,000 net tons. John Knecht, President, and E. P. Wilbur, Secretary and Treasurer. Leased by Bethlehem Iron Co., Bethlehem.

North Penn Furnace, North Penn Iron Co., Bingen, Northampton county. One stack, 63 x 18, built in 1870. Jacob Hay, President, and Enoch Phillips, Superintendent.

Saucon Furnaces, Saucon Iron Co., Hellertown, Northampton county.

Two stacks, 50 x 16, and 60 x 16, put in operation March 25, 1868, and May 25, 1870, respectively; open tops; total annual capacity, 20,000 net tons. G. W. Whitaker, President and Manager; M. Fackenthall, Secretary, and Jacob Riegel, Treasurer.

Thomas Iron Works, Thomas Iron Co., Hokendauqua, Lehigh county. Six stacks; four, 60 x 18, and two, 55 x 18; two were built in 1855, two in 1863, and two in 1873; total annual capacity, 80,000 net tons. Samuel Thomas, President; J. T. Knight, Secretary and Treasurer, and John Thomas, General Superintendent. *See Lock Ridge Furnaces.*

Uhler Furnace, Peter Uhler, owner, and Fowler & Co., lessees, Easton, Northampton county. One stack, 74 x 15, built in 1872; closed top; bell and hopper; annual capacity, 7,500 net tons.

Number of anthracite furnaces in the Lehigh region: 51 stacks.

ANTHRACITE—SCHUYLKILL VALLEY.

Anvil Furnace, Pottstown Iron Co., Pottstown, Montgomery county. One stack, 60 x 16, built in 1867; closed top; annual capacity, 10,000 net tons. *See Rolling Mills.*

Bechtelsville Furnace, Bechtelsville Iron Co., Bechtelsville, Berks county. One stack, 63 x 16, built in 1875; annual capacity, 11,500 net tons. Eli S. Bechtel, President, and Wm. H. Berlin, Secretary and Superintendent.

East Penn Iron Co., Lyons, Berks county. Two stacks, each 48 x 12½, built in 1874–5.

Edgehill Furnace, Edgehill Iron Co., Fitzwatertown, Montgomery county. Office, No. 43 North Water Street, Philadelphia. One stack, 65 x 16, built in 1872. Wm. Stokes, Treasurer.

Hampton Furnace, E. & G. Brooke, Birdsboro, Berks county One stack, 30 x 8, built in 1846. Changed from charcoal in 1873. *See Keystone Furnaces.*

Henry Clay Furnaces, Eckert & Bro., Reading, Berks county. Two stacks, 45 x 12, built in 1844; closed tops; total annual capacity, 13,000 net tons.

Keystone Furnaces of Reading, Keystone Furnace Co., Reading, Berks county. Two stacks: one, 50 x 15, built in 1869; the other, 50 x 14, built in 1872–3, blown in during June, 1873; closed tops; total annual capacity, 20,500 net tons. Jacob Bushong, President; H. M. Bushong, Secretary and Treasurer, and Jacob K. Spang, Manager.

Keystone Furnaces, E. & G. Brooke, Birdsboro, Berks county. Three stacks: two, 43½ x 12 and 55 x 15, built in 1853 and 1871, respectively; the third stack, 60 x 16, built in 1873, has a capacity of 225 net tons per week. *See Rolling Mills. See Hampton Furnace.*

Kutztown Furnace, Kutztown Iron Co., Kutztown, Berks county.

One stack, 54 x 15½, built in 1875. Thomas Wren, President, and John Humbert, Secretary.

Leesport Furnace, Leesport Iron Co., Leesport, Berks county. One stack, 45 x 14, built in 1853; weekly capacity, 200 net tons.

Lucinda Furnace, Schall & Co., Norristown, Montgomery county. One stack, 39 x 12, built in 1856. *See Rolling Mills.*

Merion and Elizabeth Furnaces, J. B. Moorhead & Co., Conshohocken, Montgomery county. Office, 230 South Third Street, Philadelphia. Two stacks: Merion Furnace, 40 x 12½, built in 1847; Elizabeth Furnace, 50 x 15, built in 1872, put in blast October 24, 1872; combined capacity about 350 net tons per week.

Mill Creek Furnace, Mill Creek Iron Co., Port Carbon, Schuylkill county. One stack, 52 x 13⅔, first put in blast in Sept., 1872. Formerly called Port Carbon Furnace. *See Rolling Mills.*

Minersville Furnace, Minersville Coal and Iron Co., Minersville, Schuylkill county. One stack, 55 x 15, built in 1872–3; blown in September 5,1873; bell-and-hopper top; iron stack; weekly capacity, 200 net tons.

Monocacy Furnace, Monocacy Furnace Co., Monocacy, Berks county. One stack, 50 x 14, built at Hopewell in 1852; moved to Monocacy in 1854; annual capacity, 7,000 net tons.

Montgomery Furnace, Montgomery Iron Co., Port Kennedy, Montgomery county. Office, 216 South Fourth Street, Philadelphia. One stack, 50 x 14, built in 1854. Abm. S. Patterson, Secretary and Treasurer.

Moselem Furnace, Moselem Iron Co., Moselem, Berks county. One stack, 48 x 12½, built in 1823, and rebuilt in 1872; closed top; annual capacity, 5,500 net tons. Wm. L. McDowell, President; G. Malin, Secretary, and Nicholas Hunter, Manager.

Mount Laurel Furnace, Clymer Iron Co., Temple, Berks county. One stack, 50 x 11, built in 1836, rebuilt in 1847, and changed to anthracite in 1873; closed top; annual capacity, 5,000 net tons. Wm. H. Clymer, President, and Hiester Clymer, Secretary. *See Charcoal Furnaces.*

Norristown Iron Works, James Hooven & Sons, Norristown, Montgomery county. One stack, 55 x 16, built in 1869; open top; annual capacity, 10,000 net tons. James Hooven, owner. *See Rolling Mills.*

Philadelphia Furnace, S. Robbins & Son, Beach and Vienna Streets, Kensington, Philadelphia. One stack, 58 x 14, built in 1873. *See Rolling Mills.*

Phœnix Iron Works, Phœnix Iron Co., Phœnixville, Chester county Office, 410 Walnut Street, Philadelphia. Three stacks, 48 x 14, 36 x 15, and 50 x 14; two built in 1845, and the third in 1849. *See Rolling Mills.*

Pioneer Furnaces, Atkins Bros., Pottsville, Schuylkill county. Three stacks, 50 x 12, 50 x 13, and 55 x 15, built in 1853, 1866, and 1872, respectively. *See Rolling Mills.*

Plymouth Furnaces, Plymouth Iron Co., S. Fulton, Agent, Conshohocken, Montgomery county. Office, 265 South Fourth Street, Philadelphia. Two stacks, 44 x 15 and 42 x 15, built in 1845 and 1864 respectively.

Reading Iron Works, Seyfert, McManus & Co., Reading, Berks county. Office, 631 Chestnut Street, Philadelphia. Two stacks, 55 x 15 and 55 x 16, built in 1854 and 1874, respectively; the new one was first blown in October 5, 1874; bell-and-hopper tops; total annual capacity, 20,000 net tons. *See Rolling Mills.*

Ringgold Iron and Coal Co., New Ringgold, Schuylkill county. One stack, 52 x 14, built in 1873; blown in February 28, 1874; annual capacity, 7,000 net tons. Edward Silliman, President; J. Albert Huntzinger, Treasurei and Edwin Harris, Superintendent.

Robesonia Furnaces, Ferguson, White & Co., Robesonia, Berks county. Two stacks, 30 x 9 and 38 x 13, built in 1845 and 1858, respectively.

Sheridan Furnaces, Wm. M. Kaufman & Co., Sheridan, Lebanon county. Two stacks: one built in 1862, and the other, 55 x 16, in 1875.

St. Clair Furnace, James Lanigan, Pottsville, Schuylkill county. Office, 329 Walnut Street, Philadelphia. One stack, 55 x 16; bell-and-hopper top. *See Swede Furnaces.*

Swede Furnaces, James Lanigan, Swedeland, Montgomery county. Office, 329 Walnut Street, Philadelphia. Two stacks, each 60 x 16, built from 1850 to 1855. *See St. Clair Furnace.*

Temple Furnace, Temple Iron Co., Temple, Berks county. One stack, 45 x 13½, built in 1867. Wm. H. Clymer, President, and Jerome L. Boyer, Treasurer and General Manager.

Topton Furnace, Topton Iron Co., Reading, Berks county. One stack, 55 x 16, built in 1873. Levi H. Leiss, President.

Warwick Furnace, Warwick Iron Co., Pottstown, Montgomery county. One stack, 55 x 16, built in 1875; annual capacity, 15,000 net tons. Griffith Jones, Secretary.

Wm. Penn Furnaces, D. O. & H. S. Hitner, Conshohocken, Montgomery county. Three stacks, 35 x 12, 50 x 14, and 40 x 12½, built in 1844, 1845, and 1854.

Number of anthracite furnaces in the Schuylkill region: 50 stacks.

ANTHRACITE—UPPER SUSQUEHANNA DISTRICT.

Bloom Furnace, Wm. Neal & Sons, Bloomsburg, Columbia county. One stack, 50 x 14, built in 1853–4, and blown in in April, 1854; open top; annual capacity, 9,000 net tons.

Chulasky Furnace, Waterman & Beaver, Chulasky, Northumberland county. Offices, Danville, Pa., and 407 Library Street, Philadelphia. One stack, 42 x 15, built in 1846. *See Pennsylvania Iron Works. See Rolling Mills.*

Columbia Furnaces, Grove Brothers, Danville, Montour county. Two stacks, 39 x 14 and 50 x 14, built in 1840 and 1860, respectively; open tops; total annual capacity, 13,756 net tons.

Duncannon Furnace, Duncannon Iron Co., Duncannon, Perry county. Office, 122 Race Street, Philadelphia. One stack, 40 x 14, built in 1853. *See Rolling Mills.*

Irondale Furnaces, Bloomsburg Iron Co., Bloomsburg, Columbia county. Branch office, 122 Race Street, Philadelphia. Two stacks, 36 x 12, built in 1844 and 1845; open tops; water-power; total annual capacity, 12,000 net tons. Charles R. Paxton, President; Wm. E. S. Baker, Treasurer, and E. R. Drinker, Manager.

Lackawanna Iron Works, Lackawanna Iron and Coal Co., Edward C. Lynde, Secretary, Scranton, Luzerne county. Five stacks; two built in 1849, one in 1852, one in 1854, and one in 1872; two are 50 x 18, one is 80 x 18, one 50 x 19, and one 67 x 23. *See Rolling Mills.*

Lewistown Furnaces, Glamorgan Iron Co., Lewistown, Mifflin county. Two stacks, 46 x 12 and 54 x 14½; one built in 1868; one built in 1872, put in blast in December, 1872; fuel, anthracite and coke, mixed; total annual capacity, 12,000 net tons. Percival Roberts, President; A. S. Roberts, Treasurer; Orleans Longacre, Manager. Philadelphia office, 265 South Fourth Street.

Lycoming Furnace, Wm. L. Williams, lessee, Ralston, Lycoming county. One stack, 42 x 12½; first put in operation in August, 1874; closed top; steam-power; annual capacity, 6,000 net tons. Out of blast in 1875 and 1876.

Mansfield Furnace, Shaaber & Johnston, Reading, Pa. Furnace at Mansfield, Tioga county. Part of Tioga Iron Works, W. G. Lutz, Superintendent. One stack, 36 x 10, built in 1854.

Marshall Furnace, Marshall Iron Co., Newport, Perry county. One stack, 50 x 14, built in 1872; closed top; annual capacity, 7,000 net tons. John Marshall, President; Charles S. Hinchman, Vice-President, and W. Price Davis, Secretary and Manager.

Matilda Furnace, B. B. Thomas, Mount Union, Huntingdon county. Office, 430 Walnut Street, Philadelphia. One stack, 42½ x 10, built in 1837; annual capacity, 3,500 net tons. Charles E. Sackett, Superintendent.

Northumberland Furnace, James S. Marsh & Co., Northumberland, Northumberland county. One stack, 61 x 18, built in 1873–4; has not been in blast since built.

Pennsylvania Iron Works, Waterman & Beaver, Danville, Montour county. Philadelphia office, 407 Library Street, Philadelphia. Three stacks: two 50 x 16, and one 34 x 14, built in 1842. *See Rolling Mills. See Chulasky Furnace.*

Rebecca Furnace, Johnston & Hemphill, Martinsburg, Blair county. One stack, 30 x 8½, built in 1817. *See Gap (bituminous) Furnace.*

Union Furnace, Beaver, Marsh & Co., Winfield, Union county. One stack, 50 x 15, built in 1854; open top; annual capacity, 7,000 net tons. Dr. L. Rooke, Manager.

Union Furnaces, Hancock Steel and Iron Co., Danville, Montour county. Two stacks, 38 x 14 and 60 x 16, built in 1867; estimated annual capacity, 14,000 net tons. These furnaces were formerly known as the Danville Furnaces, and afterwards as the National Iron Company's Furnaces. Out of blast in 1876. *See Rolling Mills.*

Number of anthracite furnaces in the Upper Susquehanna region: 26 stacks.

ANTHRACITE—LOWER SUSQUEHANNA DISTRICT.

Aurora Furnace, Wrightsville Iron Co., Wrightsville, York county. One stack, 38 x 14, built in 1867. Wm. McConkey, President.

Cameron Furnace, Cameron Furnace Co., Middletown, Dauphin county. One stack, 48 x 13½, built in 1857; 3 tuyeres; closed top; bell and hopper; use York and Cumberland hematite. James Young, President, and J. H. Landis, Treasurer.

Chestnut Hill Furnaces, Chestnut Hill Iron Ore Co., Columbia, Lancaster county. Three stacks: two 46 x 16, and one, 46 x 11; the two oldest were built in 1844 and 1853; total annual capacity, 20,000 net tons. C. J. Nourse, Superintendent.

Chickies Furnaces, Chickies Iron Co., Chickies, Lancaster county. Two stacks, 45 x 11 and 45 x 13, built in 1845 and 1854. Paris Haldeman, President, and Horace L. Haldeman, Treasurer.

Coleman's (R. W.) Heirs & Co., Cornwall, Lebanon county. Five stacks: Cornwall Anthracite Furnaces, two stacks, each 38 x 12, built in 1850 and 1854. Donaghmore Furnace, 44 x 14, built in 1855. Bird Coleman Furnace, 52 x 15, built in 1872–3. North Cornwall Furnace, 52 x 15, built in 1873–4 by Mrs. M. C. Freeman. A. Wilhelm, Attorney. *See Charcoal Furnaces.*

Conestoga Furnace, Thomas & Peacock, Lancaster, Lancaster county. Office, 430 Walnut Street, Philadelphia. One stack, 38 x 10, built in 1846; annual capacity, 6,000 net tons.

Dauphin Furnace, George Malin, Dauphin, Dauphin county. One stack, built in 1854, rebuilt in 1872.

Dock Iron Works, Gilliard Dock & Co., Harrisburg, Dauphin county. One stack, 40 x 11, built in 1873–4; closed top; annual capacity, 5,000 net tons. Has not been in blast since built.

Donegal Furnace, Benson & Cottrell, Marietta, Lancaster county. Office at Columbia. One stack, 36 x 12; open top; built in 1848; annual capacity, 6,500 net tons.

Harrisburg Furnace, A. Price's Heirs, Pittston. Furnace at Harrisburg, Dauphin county. One stack, 39 x 12, built in 1844; formerly Porter Furnace; open top; annual capacity, 6,000 net tons. Out of blast in 1875 and 1876.

Kauffman Furnace, C. S. Kauffman, Columbia, Lancaster county. One stack, 36 x 14, built in 1848; open top; annual capacity, 6,500 net tons.

Lebanon Furnaces, G. Dawson Coleman, Lebanon, Lebanon county. Two stacks, 50 x 14 and 55 x 16, built in 1846 (reconstructed in 1868) and 1872–3, respectively; the new furnace was put in blast in August, 1873. A third stack, 36 x 12, built in 1847, is being rebuilt. Charles B. Forney, Manager.

Lebanon Valley Furnace, J. & R. Meily, Lebanon, Lebanon county. One stack, 38 x 12, built in 1868.

Lochiel Furnace, Lochiel Rolling Mill Co., A. J. Dull, Manager, Harrisburg, Dauphin county. One stack, 52 x 14, built in 1873; put in blast in April, 1873; closed top; annual capacity, 7,500 net tons. *See Rolling Mills.*

Marietta Furnace No. 1, Ethelbert Watts, Marietta, Lancaster county. One stack, 47 x 12, built in 1847; annual capacity, 5,000 net tons.

Marietta Furnace No. 2, William M. Watts, Marietta, Lancaster county. One stack, 45 x 12, built in 1850.

Middletown Furnace, Lyman Nutting, Middletown, Dauphin county. Office at Lebanon, Pa. One stack, 40 x 12½, built in 1853.

Musselman Furnace, H. Musselman & Son, Marietta, Lancaster county. One stack, 41 x 14, built in 1868; open top; annual capacity, 6,000 net tons. A. H. Musselman, Manager.

Paxton Furnaces, McCormick & Co., Harrisburg, Dauphin county. Two stacks, 43 x 14 and 60 x 14, built in 1855 and 1872; total weekly capacity, 300 net tons.

Pennsylvania Steel Co., Steel Works P. O., Dauphin county. Office, 216 South Fourth Street, Philadelphia. Two stacks: one 60 x 14, built in 1872–3; put in blast in October, 1873. The other, 60 x 16, built in 1875–6; blown in in May, 1876. *See Rolling Mills.*

Richmond Furnace, Southern Pennsylvania Railway & Mining Co., Richmond Furnace, Franklin county. One stack, 36 x 9½, built in 1865; open top; annual capacity, 3,000 net tons. Formerly called Mt. Pleasant Iron Works. Thos. B. Kennedy, President; John L. Ritchey, Secretary and Treasurer, and James A. Reside, Manager.

Safe Harbor Furnace (Phoenix Iron Co., owners, 410 Walnut Street, Philadelphia), Safe Harbor, Lancaster county One stack, 45 x 14, built in 1848; annual capacity, 8,000 tons. Not in blast since 1865, but not abandoned. *See Rolling Mills.*

Stanhope Furnace, Wynkoop Bros., Pine Grove, Schuylkill county. One stack, 33 x 10, built in 1825; closed top; bell and hopper; annual capacity, 5,200 net tons. E. W Wynkoop, Manager. Out of blast since June 30, 1874.

St. Charles Furnaces, C. B. Grubb & Son, Columbia, Lancaster county. Office at Lancaster. Two stacks: one, 42 x 14, built in 1853; the other, formerly the Henry Clay, 39 x 11, built in 1845.

Union Deposit Furnace, Henry Landis, Union Deposit, Dauphin county. One stack, 39½ x 11, built in 1854 open top, annual capacity, 5,000 net tons.

Wister Furnace, J. & J. Wister, Harrisburg, Dauphin county. One stack, 45 x 14, built in 1867; open top; fuel, anthracite and coke, mixed; annual capacity, 8,000 net tons. Jones Wister, Manager.

Number of anthracite furnaces in the Lower Susquehanna region: 37 completed stacks and 1 building.

BITUMINOUS COAL OR COKE—SHENANGO VALLEY.

Allen Furnace, Henderson, Allen & Co., Sharpsville, Mercer county. One stack, 50 x 12, built in 1868; first put in operation in October, 1868; annual capacity, 10,000 net tons.

Clara Furnace, Crowther Iron Co., New Castle, Lawrence county. One stack, 75 x 16; closed top; coke; built in 1872; put in blast in May, 1872; annual capacity, 16,000 net tons. L. Raney, Manager.

Douglas Furnaces, Pierce, Kelly & Co., Sharpsville, Mercer county. Two stacks: one, 50 x 12, built in 1871; the other, 50 x 14, built in 1872; combined annual capacity, 20,000 net tons. Jonas J. Pierce, General Manager.

Etna Iron Works, Limited, New Castle, Lawrence county. Two stacks: each 50 x 12, built in 1868; combined annual capacity, 18,000 net tons. *See Rolling Mills.*

Fannie Furnace, Wheeler Iron Co., Sharon, Mercer county. One stack, 51½ x 13½, built in 1873; put in blast October 13, 1873; annual capacity, 11,000 net tons. E. A. Wheeler, President. *See Rolling Mills.*

Keel Ridge Furnace, Kimberly, Carnes & Co., Sharon, Mercer county. One stack, 55 x 13⅔, built in 1869; annual capacity, 12,000 net tons. *See Rolling Mills.*

Lawrence Furnace, Foltz & Jordan, New Castle, Lawrence county. One stack, 35 x 8½, built in 1846; fuel, coke and charcoal; open top; not in blast since 1873. Samuel Foltz, Manager.

Middlesex Furnace, William Jones, West Middlesex, Mercer county. One stack, 45 x 12, built about 1855; annual capacity, 6,000 net tons.

Mt. Hickory Furnaces, Mt. Hickory Iron Co., Sharpsville, Mercer county. Two stacks, each 50 x 12, built in 1869; combined annual capacity, 18,000 net tons. Jonas J. Pierce, General Manager.

Neshannock Furnace, Neshannock Iron Co., New Castle, Lawrence county. One stack, 60 x 15, built in 1872; first put in operation December 1, 1872; closed top; coke; annual capacity, 15,876 net tons. W. E. Reis, Manager.

Ormsby Furnace, Ormsby Iron Co., Samuel Kimberly, lessee, Sharpsville, Mercer county. One stack, 50 x 12, built in 1872; blown in in February, 1873; open top; annual capacity, 9,000 net tons.

Sharon Furnace, Boyce, Rawle & Co., Sharon, Mercer county. One stack, 46 x 10⅓, built in 1845; annual capacity, 9,000 net tons.

Sharpsville Furnace, Sharpsville Iron Co., Sharpsville, Mercer county. One stack, 50 x 11, built in 1847; annual capacity, 9,000 net tons. Jonas J. Pierce, General Manager.

Shenango Furnaces, Shenango Furnace Co., West Middlesex, Mercer county. Two stacks, each 46 x 10, built in 1859; open tops; combined annual capacity, 17,000 net tons. S. Perkins, Jr., Manager.

Shenango Iron Works, Reis, Brown & Berger, New Castle, Lawrence county. Three stacks, named Sophia, Little Pet, and Rosena; two first, 65 x 16, and 40 x 9, built in 1872 and 1853, respectively; the third, 77 x 20, completed in 1872, put in blast in June, 1873; combined annual capacity, 40,000 net tons. *See Rolling Mills.*

Spearman Furnaces, Spearman Iron Co., Sharpsville, Mercer county. Two stacks, each 50 x 14, built in 1872; one first blown in in 1873, and the other in 1875; open tops; combined annual capacity, 24,000 net tons. J. J. Spearman, Manager.

Stewart Furnaces, Stewart Iron Co., Sharon, Mercer county. Formerly Valley Furnaces. Two stacks; one, 51 x 12¾, built in 1870, and the other, 55 x 14, built in 1872; closed tops; combined annual capacity, 20,000 net tons. *See Rolling Mills.*

Wampum Furnace, Wampum Furnace Co., Wampum, Lawrence county. One stack, 50 x 13, built in 1856; open top; bituminous coal and coke; annual capacity, 8,000 net tons. Edward Kay, Manager.

Westerman Furnaces, Westerman Iron Co., Sharon, Mercer county. Two stacks, each 50 x 13, built in 1865 and 1866; combined annual capacity, 18,000 net tons. *See Rolling Mills.*

Wheatland Furnaces, James Wood's Sons & Co., Wheatland, Mercer county. Four stacks, built from 1860 to 1865; one, 46 x 9, and three, 46 x 12; combined annual capacity, 30,000 net tons. Three of these stacks were leased by Herron, Ohl & Co., to work up stock bought at the public sale of Trustees of James T. & Charles A. Wood. Their lease expired September 5, 1875, and all the stacks are now idle. *See Rolling Mills.*

Number of raw coal and coke furnaces in the Shenango region: 32 stacks.

COKE—ALLEGHENY COUNTY.

Clinton Furnace, Graff, Bennett & Co., Pittsburgh. One stack, 45 x 12, built in 1859; annual product, 12,000 net tons. *See Rolling Mills.*

Eliza Furnaces, Laughlin & Co., Pittsburgh. Two stacks, built in 1861; originally 45 x 12, but in 1873 and 1874 they were enlarged to 60 x 17, with a total yearly capacity of 36,000 net tons.

Isabella Furnaces, Isabella Furnace Co., Etna. Two stacks, 75 x 18 and 75 x 20, built in 1872; closed tops; annual capacity, 75,712 net tons. Benjamin Crowther, Manager.

Lucy Furnace, Lucy Furnace Co., (Carnegie Brothers & Co., owners,) Pittsburgh. One stack, 75 x 20, first put in blast in May, 1872; closed top; annual capacity, 41,280 net tons. A second stack, 75 x 20, building in 1876, was completed in 1877. Thomas M. Carnegie, President; Henry Phipps, Jr., Secretary and Treasurer, and James Skelding, Manager.

Shoenberger Furnaces, Shoenberger, Blair & Co., Pittsburgh. Two stacks, 62 x 13, built in 1865; closed tops; total annual capacity, 28,000 net tons.

Soho Furnace, Moorhead, McCleane & Co., Pittsburgh. One stack, 65 x 19, built in 1872; put in blast in November, 1872; annual capacity, 22,000 net tons.

Superior Furnaces, Assignee of Harbaugh, Mathias & Owens, Wood's Run. Addressed at Pittsburgh. Two stacks, 45 x 12, built in 1862–3; total annual capacity, 22,000 net tons. Out of blast since 1874. *See Rolling Mills.*

Number of coke furnaces in Allegheny county: 11 completed stacks and 1 building.

RAW BITUMINOUS COAL OR COKE—STATE.

Allegheny Furnace, S. C. Baker, Altoona, Blair county. One stack, 32 x 9, built in 1811; coke.

Blair Iron and Coal Co., Hollidaysburg, Blair county. General office, 218 South Fourth Street, Philadelphia. Four stacks: Bennington Furnace, at Bennington, Blair county, 40 x 9½, built in 1856; No. 1 and No. 2, at Hollidaysburg, 43 x 12 and 41 x 11, respectively, built in 1856; and Frankstown Furnace, at Frankstown, 40 x 10, built in 1836, rebuilt in 1872, and put in blast November 1, 1872, run in 1875 on spiegeleisen for the Cambria Iron Co.'s steel works. All use coke; closed tops; combined annual capacity, 21,000 net tons. President, Dr. Charles Stewart Wurts, Philadelphia; Secretary and Treasurer, W. S. Robinson, Philadelphia, and Manager, W. R. Babcock, Hollidaysburg

Brady's Bend Furnaces, Brady's Bend Iron Co., Brady's Bend, Armstrong county. Four stacks, 44 x 9, 44 x 10½, 50 x 14, and 50 x 13½, built from 1842 to 1845; coke; 2 open tops, and 2 closed; total annual capacity, 20,000 net tons. Not in blast since 1874. *See Rolling Mills.*

Cambria Iron Works, Cambria Iron Co., Johnstown, Cambria county. Office, 218 South Fourth Street, Philadelphia. Coke. Six stacks: five at Johnstown, three of which are 48 x 13, one is 70 x 15, and one is 75 x 20; the four first built from 1852 to 1854, and the fifth built in 1872–6, and blown in December 22, 1876; the sixth stack at Conemaugh Station, two miles east, 45 x 12, built in 1857, rebuilt in 1876. *See Rolling Mills.*

Charlotte Furnace, Everson, Knap & Co., Scottdale, Westmoreland county. One stack, 65 x 16; coke; built in 1872–3; put in blast October 14, 1873; annual capacity, 13,000 net tons.

Dunbar Furnace, Parrish & Hazard, lessees, Dunbar, Fayette county. One stack, 75 x 20, built in 1790, rebuilt in 1870 and 1876; Whitwell hot-blast stoves applied in 1876; Connellsville coke and native ores; old stack was called "Union."

Elizabeth Furnace, Martin Bell & Co., Sabbath Rest, Blair county. One stack, 32 x 9, built in 1832; coke.

Fairchance Furnace, Fairchance Iron Co, Uniontown, Fayette county. One stack, 45 x 13, built in 1784, and rebuilt in 1871; coke. *See Charcoal Furnaces.*

Gap Furnace, Johnston & Hemphill, McKee, Blair county. One stack, 36 x 10, built in 1846. *See Rebecca Furnace, Upper Susquehanna.*

Howard Furnace, Lauth, Thomas & Co., Howard, Centre county. One stack, 33 x 8, built in 1830; coke; annual capacity, 5,000 net tons. *See Rolling Mills and Charcoal Furnaces.*

Juniata Furnace, Williamsburg Manufacturing Co., Williamsburg, Blair county. One stack, 28 x 8½, built in 1857; open top; Connellsville coke; water-power; annual capacity, 2,500 net tons. President, A. M. Lloyd; Secretary, Robert Stewart; Treasurer, Wm. A. Fluke, and Manager, George Fay.

Kemble Furnaces, Kemble Coal and Iron Co., Riddlesburg, Bedford county. Wm. Lauder, Superintendent, Riddlesburg. General office, 20 Nassau Street, New York; address P. O. Box 157. Two stacks, 60 x 14, built in 1869 and 1870; the first was put in blast July 4, 1869, and the second, March 4, 1871; closed tops; coke from washed coal; total annual capacity, 18,000 net tons. R. P. Parrott, President, and R. A. Wight, Secretary, New York.

Le Monte Furnace, Le Monte Furnace Co., Uniontown, Fayette county. One stack, 65 x 15, built in 1875; put in blast in January, 1876; use Connellsville coke and native ores; annual capacity, 14,000 net tons.

Mahoning Furnace, J. A. Colwell & Co., Oakland, Armstrong county. One stack, 40 x 10½, built in 1845; closed top; coke; annual capacity, 3,900 net tons.

Monticello Furnace, Assignees of McKnight, Porter & Co., Monticello, Armstrong county. One stack, 53 x 11⅙, built in 1859; coke; annual capacity, 7,000 net tons.

Oliphant Furnace, F. H. Oliphant, Uniontown. One stack, 50 x 11, built in 1875–6; put in blast in 1876; coke.

Pine Creek Furnace, Brown & Mosgrove, Kittanning, Armstrong county. One stack, 47 x 11, built in 1846; open top; coke; annual capacity, 3,800 net tons. John P. Painter, Manager.

Red Bank Furnace, Reynolds & Moorhead, Red Bank Furnace, Clarion county. One stack, 40 x 11, built in 1859; coke.

Rockhill Furnaces, Rockhill Iron and Coal Co., Orbisonia, Huntingdon county. Office, 320 Walnut Street, Philadelphia: Wm. A. Ingham, President. Two stacks, each 65 x 17, built in 1873–5; coke; total annual capacity, 22,000 net tons.

Rodman Furnaces, Charles Knap & Co., Roaring Springs, Blair county. Two stacks, 42 x 9 and 45 x 14; coke; total annual capacity, 10,500 net tons.

Sligo Furnace, J. P. Lyon & Co., Sligo, Clarion county. One stack, 32 x 9, built in 1845; rebuilding; coke *See Madison (charcoal) Furnace.*

Stewardson Furnace, F. B. & A. Laughlin, Mahoning, Armstrong county. One stack, 43½ x 11, built in 1851; coke; open top; annual capacity, 4,000 net tons.

Number of raw coal or coke furnaces in Pennsylvania, outside of Allegheny county and the Shenango region: 35 completed stacks, and 1 building.

CHARCOAL—STATE.

Barre Furnace, Estate of A. L. Mumper. Barre Forge, Huntingdon county. One stack, 33 x 9, built in 1863; hot blast; open top; water-power; annual capacity, 2,000 net tons. *See Bloomaries.*

Big Pond Furnace, Philadelphia and Reading Coal and Iron Co., Newville, Cumberland county. One stack, 33 x 8½, built in 1836.

Carlisle Iron Works, C. W. & D. V. Ahl, Boiling Springs, Cumberland county. Office at Carlisle. One stack, 28 x 8½, built in 1776, and rebuilt in 1810; hot and cold blast; water-power; annual capacity, 2,000 net tons. *See Bloomaries.*

Carrick Furnace, R. M. Shalter, Fannettsburg, Franklin county. One stack, 30 x 8, built in 1828; annual capacity, 1,800 net tons.

Chestnut Grove Furnace, Jesse R. Group, Idaville, Adams county. One stack, 30 x 8½, built in 1830; cold blast; closed top; annual capacity, 1,000 net tons. Out of blast in 1875 and 1876.

Cornwall Furnace, R. W. Coleman's Heirs & Co., Cornwall, Lebanon county. One stack, 31 x 8, built in 1742. A Wilhelm, Attorney. *See Lower Susquehanna Furnaces.*

Eagle Furnace, C. Curtin & Co., Roland, Centre county. One stack, 28 x 7½, built in 1848; open top, open hearth, and closed tuyere; cold blast; water-power; annual capacity, 1,800 net tons. *See Rolling Mills and Bloomaries.*

East Penn Furnace, John Balliet, Parryville, Carbon county. One stack, 28 x 7½, built in 1837; cold blast; water-power.

Emma Furnace, Logan Iron and Steel Co., Lewistown, Mifflin county. Office, 218 South Fourth Street, Philadelphia. One stack, 34 x 9, built in 1867; warm and cold blast. *See Rolling Mills and Bloomaries. See Greenwood Furnaces.*

Erie Furnace, Rawle, Noble & Co., Erie, Erie county. One stack, 55 x 9½, built in 1869; hot blast; annual capacity, 8,000 net tons. Run on bituminous coal for several years; now charcoal.

Etna Furnace, George D. Isett & Bro., Yellow Springs, Blair county. One stack, 31 x 8, built in 1805; cold blast. *See Bloomaries.*

Forest Iron Works, A. Pardee, White Deer Mills, Union county. Office at Hazleton, Luzerne county. One stack, 35 x 9, built in 1846.

Franklin Furnace, Hunter & Springer, St. Thomas, Franklin county. One stack, 32 x 7½, built in 1828; cold blast; annual capacity, 1,500 net tons.

Greenwood Furnaces, Logan Iron and Steel Co., Greenwood Works, Huntingdon county. Office, 218 South Fourth Street, Philadelphia. Two stacks, 30 x 8½, and 32 x 8½, built in 1833 and 1863, respectively; cold blast. *See Rolling Mills and Bloomaries. See Emma Furnace.*

Hecla Furnace, McCoy & Linn, Milesburg, Centre county. One stack, 32 x 9, built in 1820, cold blast; water-power. *See Rolling Mills and Bloomaries.*

Hope Furnace, Joseph S. Brown & Co., Rose Point, Lawrence county. One stack, 28 x 8, built in 1868; cold blast.

Hopewell Furnace, Clingan & Buckley, Douglassville, Berks county. One stack, 30 x 7, built in 1759; cold blast.

Hopewell Furnace, Lowry, Eichelberger & Sons, Hopewell, Bedford county. One stack, 30 x 8½, built in 1800; warm blast; open top; water-power; annual capacity, 1,600 net tons.

Howard Furnace, Lauth, Thomas & Co., Howard, Centre county. One stack, 31 x 8½, built in 1833; cold blast; water-power. *See Rolling Mills and Bituminous Furnaces.*

Isabella Furnace, Smith & Bros., Barneston, Chester county. One stack, 33 x 8, built in 1835 and rebuilt in 1864; cold blast; water-power.

Jefferson Furnace, John M. Kaufman & Bros., Auburn, Schuylkill county. One stack, 31 x 7, built in 1864; cold blast; water-power.

Joanna Furnace, L. B. Smith & Co., Joanna Furnace, Berks county. One stack, 30 x 8, built in 1792 and rebuilt in 1847; cold blast; water and steam power.

Laura Furnace, W. A. Taylor & Co., Millerstown, Perry county. One stack, 35 x 9, built in 1873; cold blast; water-power; weekly capacity, 35 net tons.

Logan Furnace, Valentine & Co., Bellefonte, Centre county. One stack, 32 x 8, built in 1815; cold blast; water-power; open top; annual capacity, 3,000 net tons. *See Rolling Mills.*

Madison Furnace, J. P. Lyon & Co., Sligo, Clarion county. One stack, 32 x 9, built in 1836; cold blast. *See Bituminous Furnaces.*

Maiden Creek Furnace, Heirs of George Merkel, Lenhartsville, Berks county. One stack, 33 x 9, built in 1854; cold and warm blast; water and steam power; open top; annual capacity, 1,600 net tons.

Manada Furnace, Grubbs & Bland, Swatara Station, Dauphin county. One stack, 31 x 8, built in 1837; cold blast; water-power.

Mont Alto Furnace, Mont Alto Iron Co., Mont Alto, Franklin county. One stack, 37½ x 9½, built in 1807; cold and warm blast; open top; annual capacity, 5,000 net tons. I. S. Waterman, President, 407 Library Street, Philadelphia, and George B. Wiestling, Superintendent, Mont Alto. *See Bloomaries.*

Mount Hope Furnace, A. Bates Grubb, Mount Hope, Lancaster county. One stack, 27 x 7, built in 1785; put in blast in 1875, after a rest of several years; hot blast.

Mount Penn Furnace, Hunsicker & Co., Reading, Berks county. One stack, 30 x 8½, built in 1830; cold blast; water-power. Out of blast in 1875 and 1876.

Oley Furnace, Clymer Iron Co., Temple, Berks county. One stack, 30 x 8, built in 1770; cold blast; water-power; annual capacity, 1,200 net tons. Wm. H. Clymer, President, and Hiester Clymer, Secretary. *See Schuylkill Valley Furnaces.*

Pennsylvania Furnace, Lyon, Shorb & Co., Graysville, Huntingdon county. One stack, 32 x 9, built in 1813. *See Bloomaries.*

Pine Grove Furnace, South Mountain Iron Co., Mountain Creek, Cumberland county. One stack, 33 x 9, built in 1770; open top; hot blast; water-power; annual capacity, 2,000 net tons. Samuel Thomas, President; J. T. Knight, Secretary and Treasurer; Josiah Bachman, Cashier, and S. C. Miller, Superintendent.

Sarah Furnace, Assignees of Essington Hammond, Sarah, Blair county. One stack, 32½ x 8⅚, built in 1824; cold blast; open top; annual capacity, 1,500 net tons. *See Bloomaries.*

Springfield Furnace, John Royer, Royer P. O., Blair county. One stack, 31 x 8½, built in 1815; hot blast; water-power; open top; annual capacity, 1,600 net tons. A. McAllister, Manager. *See Bloomaries.*

Springhill Furnace, Fairchance Iron Co., Smithfield, Fayette county. One stack, 35 x 9, built in 1805, rebuilt in 1854, and repaired in 1873. *See Bituminous Furnaces.*

Washington Iron Works, Jacob Yearick, lessee, Lamar, Clinton county. One stack, 30 x 7, built in 1809. *See Bloomaries.*

York Furnace, John Bair & Co., York Furnace, York county. One stack, 32 x 8, built in 1830; cold blast; water-power.

Number of charcoal furnaces in Pennsylvania: 39 stacks. Total number of furnaces in Pennsylvania: 281 completed stacks, and 3 building.

RECENTLY ABANDONED FURNACES.

NOTE—Some of the furnaces named in this list have been standing for many years with good machinery, and at some time may again be put in operation.

ANTHRACITE.

Shamokin Furnace, David Longenecker, Shamokin, Northumberland county. One stack; built in 1841; abandoned in 1869.

BITUMINOUS COAL AND COKE.

Enterprise Furnace, Hite's Station, Allegheny county. Built in 1871–2; torn down in 1872, and not rebuilt.

Homewood Furnace, Homewood, Beaver county. Built in 1859; abandoned in 1866.

Sarah Furnace, R. Jennings & Co., Catfish, Clarion county. Built in 1846.

CHARCOAL.

Augusta Furnace, Harrisburg and Potomac Railroad Co., D. V. Ahl, President, Newville, Cumberland county. Furnace near Shippensburg. One stack, built in 1828.

Bald Eagle Furnace, Lyon, Shorb & Co. (of Pittsburgh), Tyrone, Blair county. Built in 1824.

Bloomfield Furnace, C. Knap & Co. (of Roaring Spring, Blair county), Bloomfield, Bedford county. Built in 1845.

Buffalo Furnace, Graff & Painter, Armstrong county. Built in 1839.

Caledonia Furnace, Estate of Thaddeus Stevens, Graeffenberg, Adams county. One stack, 33 x 8, built in 1837. Furnace in Franklin county.

Cumberland Furnace, Ahl & Bro., Dickinson, Cumberland county. Out of blast for many years; purchased in 1872 by Ahl & Bro., who intend to operate the mines in its vicinity, and perhaps fit up the furnace. Built in 1794.

Edward Furnace, J. M. & S. H. Bell, Vineyard Mills, Huntingdon county. Built in 1835; abandoned in 1860.

Huntingdon Furnace, G. & J. H. Shoenberger, Spruce Creek, Huntingdon county. Built in 1796; abandoned in 1870.

Indiana Furnace, S. C. Baker, Altoona, Blair county. Furnace in Indiana county. Built in 1840.

Lehigh Furnace, Hewitt & Balliet, Lehigh Furnace, Lehigh county. Built in 1826.

Margaretta Furnace, Thomas Himes, Margaretta, York county. Built in 1825.

Mary Ann Furnace, Horatio Trexler, Long Swamp, Berks county. Built in 1797; out of blast since 1869.

Mill Creek Furnace, E. A. Green & Co., Mill Creek, Huntingdon county. Built in 1838; out of blast since 1869.

Montebello Furnace, Fisher & Morgan, Duncannon, Perry county. One stack, 42 x 12, built in 1834; water-power. Has made 4,000 net tons of pig iron in a year.

Paradise Furnace, H. Trexler, Reading, Berks county. Built in 1821.

Pike Furnace, Hunter Orr, Lawsonham, Clarion county. Built in 1845.

Rockhill Furnace, Orbisonia, Huntingdon county. The Rockhill Iron and Coal Co. own the site of this furnace, have built two bituminous coal stacks near it, and abandoned the charcoal furnace in the spring of 1873. Built in 1830.

Sally Ann Furnace, Daniel S. Hunter, Bower's Station, Berks county. Built in 1791.

ROLLING MILLS.

[Mills which roll rails are marked with a star.]

EASTERN DISTRICT.

* Allentown Rolling Mill Co., consolidation of Allentown Rolling Mill, Lehigh Rolling Mill, and Roberts Iron Co. Works at Allentown, Lehigh county. Office, 303 Walnut Street, Philadelphia. Built in 1860; 2 single and 23 double puddling furnaces, 11 single heating furnaces, and 8 trains of rolls; product, T and street rails, from 16 lbs. upwards, fish plates, merchant bars, spikes, bolts, nuts, rivets, axles, machinery, bridge work, and mine and flat cars. A. Pardee, Jr., President; C. W. Leavitt, Secretary; H. W. Allison, Treasurer, and C. H. Nimson, Superintendent. *See Lehigh Valley Furnaces.*

* Bethlehem Iron Co., Bethlehem, Northampton county. Built in 1863. Mill No. 1: 14 double puddling furnaces, 9 heating furnaces, and 3 trains of rolls; product, railroad iron; annual capacity, 22,500 net tons; average annual production, 18,000 tons. Mill No. 2: shaped like a double cross, 931 feet long, each arm being 386 feet by 111 feet; 24 and 26-inch rail trains, 124 feet 9 inches in length from centre to centre of engines; north engine, 48 in. x 46 in. stroke; south engine, 56 in. x 48 in. stroke; one 31-inch bloom train, with one engine 36-inch diameter and 60-inch stroke. Steel works: 2 5-ton converters; cupola engine, 18 in. x 48 in.; blowing engine, 36 in. x 60 in.; 7 Siemens regenerative gas furnaces for heating ingots and blooms; 4 cupola furnaces, and 2 spiegel-melting furnaces; made first blow Oct. 4, 1873. Alfred Hunt, President; Abraham S. Schropp, Secretary; C. O. Brunner, Treasurer, and John Fritz, Superintendent. *See Lehigh Valley Furnaces.*

Birdsboro Nail Works, E. & G. Brooke, Birdsboro, Berks county. Built in 1848; 7 double puddling furnaces, 2 scrap and 3 heating furnaces, 72 nail machines, and 2 trains of rolls; steam and water power; product, nails. *See Schuylkill Valley Furnaces.*

Blandon Iron Works, Blandon Iron Co., Blandon, Berks county. Built in 1867; 1 double and 3 single puddling furnaces, 1 heating furnace, and 2 trains of rolls; product, skelp and band iron; annual capacity, 2,500 net tons.

Brandywine Rolling Mills, S. & B. R. Hatfield, Coatesville, Chester county. Built in 1845; two mills, one-fourth of a mile apart, run by water-power; 2 heating furnaces, and 2 trains of rolls; product, plate iron; annual capacity, 2,000 net tons. Puddling department in Huntingdon county, Pa. *See Bloomaries.*

Bristol Rolling Mill, Bristol Rolling Mill Co., Bristol, Bucks county. Built in 1875; 1 heating furnace, and 2 trains of rolls (one 8 and one 12-inch); product, hoop, scroll, bar and band iron; annual capacity, 1,200 net tons. Fred. Nevigold, President; Geo. F. Pierson, Secretary, and Edwin Manship, Treasurer.

* Catasauqua Manufacturing Co., Catasauqua, Lehigh county. Two mills: Catasauqua and Ferndale. Company organized in 1864; 27 single puddling furnaces, 9 heating furnaces, 7 trains of rolls (10, 15, 18, and 22-inch), and one 10-ton hammer; product, merchant bar, small T rails, car axles, shafting, and iron and steel sheets and plates; annual capacity, 20,000 net tons. Oliver Williams, Manager.

Chester Rolling Mills, Chester, Delaware county. Built in 1875; 6 puddling furnaces, 2 Siemens heating furnaces, and 3 trains of rolls; product, boiler and ship plate. John Roach, President, and C. B. Houston, Secretary and Treasurer.

Conshohocken, Pennsylvania, and Corliss Iron Works, J. Wood & Brothers, Conshohocken, Montgomery county. Office, 223 North Second Street, Philadelphia. Built in 1832, 1852, and 1864, respectively; 6 double puddling furnaces, 7 heating furnaces, and 7 20-inch trains of rolls; steam and water power; product, plate and sheet iron, embracing flue, boiler, tank, gasometer, nail, tack, shovel, and safe iron; annual capacity, 6,000 net tons.

Delaware Rolling Mills, Hughes & Patterson, Richmond and Otis Streets, Kensington, Philadelphia. Built in 1870; 8 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls; product, merchant bar iron; annual capacity, 8,000 net tons.

Easton Sheet Iron Works, Oliver & Co., Easton, Northampton county. Built in 1871, and put in operation February 1, 1872; 2 single puddling furnaces, 1 heating furnace, 1 sheet furnace, 1 annealing furnace, and 1 train of 22-inch rolls, consisting of 1 pair sheet rolls and 1 pair bar rolls; product, sheet iron; annual capacity, 1,000 net tons. Production sold by Marshall Lefferts, Jr., 90 Beekman Street, New York.

Fair Hill Forge and Rolling Mill, Gaulbert, Morgan & Caskey, York and America Streets, Philadelphia. Built in 1854; 1 single and 2 double puddling furnaces, 3 heating furnaces, 2 trains of rolls, and 1 hammer; product, merchant bar; annual capacity, 4,000 net tons.

Fort Allen Iron Works, Weissport, Carbon county. Ezra Bertolet, Agent, 250 South Fourth Street, Philadelphia. Rebuilt in 1872; 1 single and 2 double puddling furnaces, 2 heating furnaces, 1 squeezer, and 2 trains of rolls (one 9, and one 16-inch); product, guide and bar iron; annual capacity, 3,000 net tons. Not in operation in 1875 and 1876.

Fulton Rolling Mill, Phila. and Reading Coal and Iron Co., Norristown, Montgomery county. Built in 1861; 11 double puddling furnaces, 1 rotary squeezer, and 1 train 18-inch puddle rolls; product, puddled bar; annual capacity, 15,000 net tons. This mill is now standing, and is for sale or to rent. Agent, W. E. C. Coxe, Reading.

Gibraltar Iron Works, S. Seyfert & Co., Reading. Built in 1846; 2 heating furnaces, 2 hammers, and one 16-inch train of rolls; water-power; product, boiler plate, boiler tube iron, and charcoal blooms; annual capacity 1,500 net tons plate iron, and 1,000 tons blooms.

Glasgow Iron Works, Glasgow Iron Co., Pottstown, Montgomery county. Built in 1874; 4 double puddling furnaces, and 1 train of muck rolls; water-power; annual capacity, 5,000 net tons. A plate mill was added in 1876, to be operated by steam, and to contain 3 heating furnaces and 1 train of rolls, 96 inches long. Annual capacity to be 6,000 net tons. Boiler plate quality a specialty. Joseph L. Bailey, President; Comly B Shoemaker, Treasurer; G. W. Nicolls, Secretary, and Edward Bailey, General Manager.

* Glen Iron Works, Allentown. First put in operation in 1870; 6 double and 2 single puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 8½ and two 15-inch); product, bar iron and small T rails; annual capacity, 7,500 net tons. Joseph Downing, Superintendent. Not in operation in 1875 and 1876.

Gray's Ferry Iron Works, Edward S. Buckley, 228½ Walnut Street, Philadelphia. Built in 1858; 3 double puddling furnaces, 4 charcoal forge fires, 4 heating furnaces, 2 trains of rolls, and 2 hammers; product, plate iron and charcoal blooms; annual capacity, 3,600 net tons plate, and 600 tons blooms.

Hamburg Iron Works (Phila. and Reading R. R. Co., owners), James Henderson, lessee, Hamburg, Berks county. Built in 1865; 3 double and 2 single puddling furnaces, 4 heating furnaces, and 2 trains of rolls (10 and 18-inch); product, bar iron of high class for machinery and tools by the Henderson process; annual capacity, 4,000 net tons.

Hibernia Forge and Rolling Mill Goodman & Philips, Wagontown, Chester county. Built in 1793 and 1837; 4 charcoal forge fires, 1 heating furnace, 1 hammer, and 1 train of rolls; use wrought scrap; water-power; product, boiler-tube iron, skelp, flue, and light boiler plate; annual capacity, 1,000 net tons.

Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware Avenue, Philadelphia. Built in 1845; 1 single and 10 double puddling furnaces, 8 heating furnaces, and 7 trains of rolls; product, merchant bar, band, and skelp iron, and steel plow and shovel plate; annual capacity, 11,000 net tons.

Keystone Iron Works, Reading, Berks county. Built in 1857; 5 single puddling furnaces, 2 heating furnaces, and one 16-inch train of rolls; product, boiler plate, tank, chute, stack, pipe, boat, and car iron, and muck bars; annual capacity, 2,000 net tons. J. V. Craig, President; Jacob Snell, Secretary, and John H. Craig, Treasurer.

Laurel Iron Works, Hugh E. Steele, Coatesville, Chester county. Built in 1825; 1 annealing furnace, 4 heating furnaces, and 3 trains of rolls; water and steam power; product, boiler, flue, boat, bridge, tank, and tube iron; annual capacity, 4,800 net tons.

Lehigh Works and Franklin Works, Stewart & Co., Easton, Northampton county. Built in 1837; 4 heating furnaces, and 2 trains of rolls; product, wire rods, drawn into wire at the same establishment; annual capacity, 5,000 net tons.

*Little Schuylkill Rolling Mill, James A. Inness, Port Clinton, Schuylkill county. Built in 1868; 1 double and 2 single puddling furnaces, 1 heating furnace, and 3 trains of rolls (one 10, one 16, and one 18-inch); water-power; product, merchant bar, and small T rails; annual capacity, 3,000 net tons merchant bar.

Lukens Roll Mills, Huston & Penrose, Coatesville. Built in 1810; 3 double puddling furnaces, 4 heating furnaces, 2 trains of rolls, and 1 hammer; steam and water power; product, all kinds of flue, boiler and ship plates, and bridge iron; annual capacity, 6,000 net tons. The puddle mill, operated by water-power, occupies the site of the first plate mill built in the United States.

McIlvain (Wm.) & Sons' Boiler Plate Mill, Wm. McIlvain & Sons, Reading. Built in 1857; 4 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, and one 3-ton hammer; product, boiler plate, tank, chute, stack, pipe, bridge, and boat iron; annual capacity, 4,500 net tons. *See Bloomaries.*

*Mill Creek Iron Co., Mount Carbon, Schuylkill county. Four double puddling furnaces, 3 heating furnaces, and 3 trains of rolls (one 16, one 18, and one 24-inch); product, merchant bar and plate iron. *See Schuylkill Valley Furnaces.*

Norristown Iron Works, James Hooven & Sons, Norristown, Montgomery county. Built in 1846; 6 double puddling furnaces, 3 heating furnaces, 3 trains of rolls, and 1 hammer; product, skelp iron; annual capacity, 5,000 net tons. James Hooven, owner. *See Schuylkill Valley Furnaces.*

Oxford Iron and Steel Works, William & Harvey Rowland, Frankford, Philadelphia. Built in 1842, and very much enlarged recently, especially in 1873; 3 heating furnaces, 3 trains of rolls, 1 hammer, 4 converting furnaces using wood exclusively, 2 converting furnaces using coal, and 24 2-pot crucible steel melting furnaces; convert iron into steel, re-roll Norway iron, slit Norway nail rods, and make elliptic springs, sheet cast steel, spring cast steel, machinery and plow steel, and tire and sleigh steel; annual capacity, 4,500 net tons.

* Palo Alto Rolling Mill, Benjamin Haywood, Pottsville, Schuylkill county. Built in 1854; 12 double and 5 single puddling furnaces, 9 heating furnaces, and 5 trains of rolls (one 8, two 16, and two 18-inch); product, light and heavy T and street rails, fish bars, chairs, and merchant bar iron; annual capacity, 15,000 net tons.

Parkesburg Iron Works, Horace A. Beale, Parkesburg, Chester county. First started in April, 1873; 4 charcoal forge fires, 2 heating furnaces, 1 train of rolls, and 1 hammer; product, blooms and tube skelp; annual capacity, 2,500 net tons.

Pencoyd Iron Works, A. & P. Roberts & Co., 265 South Fourth Street, Philadelphia. Works in Montgomery county, opposite Manayunk. Built in 1852; 9 double puddling furnaces, 10 heating furnaces, rotary squeezer, and 2 trains of rolls (18 and 23 inch); product, channel bars, tee and angle iron, hammered axles, rolled axles, and bar and bridge iron; the forge has 4 hammers; annual capacity, 10,000 net tons.

Penn Treaty Iron Works, Marshall Brothers & Co., 24 Girard Avenue, Philadelphia Rolling Mill at 1201 Beach Street. Built in 1856; 6 single puddling furnaces, 6 heating furnaces, and 4 trains of rolls; product, sheet and bar iron; annual capacity, 4,000 net tons.

*Philadelphia and Reading Rolling Mill, Philadelphia and Reading Coal and Iron Co., owners, W. E. C. Coxe, Superintendent, Reading. Built in 1868; 12 single puddling furnaces, 10 heating furnaces, and 3 trains of rolls (one 23, one 24 and one 12-inch); product, iron and steel rails and splice bars; annual capacity, 25,000 net tons.

*Philadelphia Iron and Steel Co., 939 North Delaware Avenue, Philadelphia. Built in 1845; 1 single and 2 double puddling furnaces, 1 rotary squeezer, 7 heating furnaces, and 5 trains of rolls (two 8, one 12, and two 18-inch); product, bar, angle, and tee iron, fish plates, beams, street rails, and peculiar shapes; average annual capacity, single turn, 8,000 net tons. John P. Verree, President; W. A. Mitchell, Vice-President and Superintendent, and B. F. Hart, Secretary and Treasurer.

Philadelphia Rolling Mill, S. Robbins & Son, Beach and Vienna Streets, Kensington, Philadelphia. Built in 1858; 9 double puddling furnaces, 5 heating furnaces, and 4 trains of rolls; product, merchant bar iron of all kinds; annual capacity, 14,000 net tons. *See Schuylkill Valley Furnaces.*

* Phœnix Iron Works, Phœnix Iron Co., Phœnixville, Chester county. Office, 410 Walnut Street, Philadelphia. Built in 1808; 20 double and 8 single puddling furnaces, 23 heating furnaces, and 5 trains of rolls (one 9, one 12, one 16, and two 18-inch); product, bar iron, beams, angles, tee iron and other shapes, and rails; annual capacity, 25,000 net tons. The Company is building a new mill, of greater capacity than the old one. Samuel J. Reeves, President; John Griffen, Superintendent; George Gerry White, Secretary and James O. Pease, Treasurer. *See Schuylkill Valley Furnaces.*

Pine Iron Works, Joseph L. Bailey & Co., Pine Iron Works, Berks county. Built in 1845; 2 heating furnaces and 1 train of rolls; water-power; product, boiler plate; annual capacity, 2,600 net tons. Sole manufacturers of the "Pine" brands of extra flange and fire-box iron.

Potts Grove Iron Works, Potts Brothers, Pottstown, Montgomery county. Built in 1846; 2 double puddling furnaces, 3 heating furnaces, and 2 trains of rolls; product, plate iron, comprising boiler, tank, pipe, and flue iron; annual capacity, single turn, 3,000 net tons. This firm also has an 8-inch bar mill, 3,000 net tons yearly capacity, which has not been worked for many years.

Pottstown Iron Co., Pottstown, Montgomery county. Built in 1867; 14 double puddling furnaces, 6 heating furnaces, 4 trains of rolls, 54 nail machines, 1 hammer, and 1 squeezer; product, nails, and boiler, ship, and tank plate iron; annual capacity, nails, 6,000 net tons, plate, 6,000 tons. President, Theo. H. Morris; Vice-President, Andrew Wheeler; Secretary, Joseph K. Wheeler; and Treasurer and General Manager, Wm. H. Morris. *See Schuylkill Valley Furnaces.*

* Pottsville Rolling Mills, Atkins Brothers, Pottsville. Built in 1852; 14 double and 4 single puddling furnaces, 8 heating furnaces, and 3 trains of rolls; product, T rails of both light and heavy sections, and street rails. *See Schuylkill Valley Furnaces.*

Reading Bolt and Nut Works, J. H. Sternbergh, Reading. Built in 1865; enlarged in 1872; 1 single puddling furnace, 2 heating furnaces, 1 10-inch train of rolls, and 1 hammer; product, merchant bar iron, machine bolts, lag screws, rods for buildings, bridges, etc., and hot pressed nuts of all sizes; annual capacity, about 3,000 net tons.

Reading Iron Works, Seyfert, McManus & Co., Reading. Office, 631 Chestnut Street, Philadelphia. Built in 1836; 12 single puddling furnaces, 4 heating furnaces, 1 rotary squeezer, 3 trains of rolls, 30 nail machines, and 2 railroad spike machines; product, cut nails, bar, band, hoop, and skelp iron; annual capacity, 5,500 net tons. Plate mill built in 1862; 7 double puddling furnaces, 4 heating furnaces, 1 hammer, and 4 trains of rolls; product, sheet, plate, and bar iron; annual capacity, 6,800 net tons. *See Schuylkill Valley Furnaces.*

* Schuylkill Haven Rolling Mill and Spike Manufacturing Co., Weissinger & Medlar, Schuylkill Haven, Schuylkill county. Put in operation November 1, 1873; 2 heating furnaces, 2 trains of rolls (one 8 and one 16-inch), and 1 railroad spike machine; product, merchant bar iron, small T rails, and railroad spikes; annual capacity, 3,000 net tons.

Schuylkill Iron Works, Alan Wood & Co., Conshohocken. Office, 519 Arch Street, Philadelphia. Built in 1858; 16 double puddling furnaces, 12 heating and 4 grate furnaces, 7 trains of rolls, 1 hammer, and 2 rotary squeezers; product, sheet and plate iron; annual capacity, 15,000 net tons.

Stony Creek Iron Works, Schall & Co., Norristown, Montgomery county. Built in 1849; 5 double puddling furnaces, 4 heating furnaces, 3 trains of rolls, and 29 nail machines; product, bar, sheet, boiler plate, and nails. No nails made since 1872. *See Schuylkill Valley Furnaces.*

* Tamaqua Rolling Mill, Wm. T. Carter & Co., Tamaqua, Schuylkill county. Office, 103 Walnut Street, Philadelphia. Built in 1865; 2 double and 3 single puddling furnaces, 2 heating furnaces and 2 trains of rolls (one $8\frac{1}{2}$ and one 16-inch); product, merchant bar iron, iron and steel mine T rails, and railroad spikes; annual capacity, 3,000 net tons. *See Coleraine Furnaces, Lehigh Valley.*

Thorndale Iron Works, Wm. L. Bailey & Co., Thorndale Iron Works, Chester county. Built in 1847; 1 double and 2 single puddling furnaces, 2 heating furnaces, 2 trains of rolls (plate train 73 inches long), and 1 hammer; product, boiler-plate iron; annual capacity, 3,000 net tons.

Tioga Rolling Mill, Noblit & Brother, Germantown Junction, Philadelphia. Put in operation January 1, 1873; 2 heating furnaces, 2 trains of rolls (one 8 and one 10-inch), 1 hammer, and 3 spike machines; product, hoop, band, scroll, horse-shoe, and guide iron, and railroad spikes; annual capacity, 2,500 net tons.

Valley Iron Works, C. E. Pennock & Co., Coatesville, Chester county. Built in 1837; 4 double puddling furnaces, 4 heating furnaces, one 4-ton steam hammer, and 4 trains of rolls (one 18, one 24, and two 30-inch); product, plate iron; annual capacity, 7,000 net tons. *See Bloomaries.*

Viaduct Iron Works, Hugh E. Steele, lessee, Coatesville. Built in 1838; 3 single puddling furnaces, 8 heating furnaces, 4 trains of rolls, and 1 hammer; product, all kinds of boiler, fire-box, boat, tank, tube and flue iron, and patent straightened bridge plates; annual capacity, 11,000 net tons. *See Laurel Iron Works.*

Winch (Corydon), Canal Street, Kensington, Philadelphia. New mill built in 1874; 1 double and 2 single puddling furnaces, 2 heating furnaces, 4 trains of rolls, 12 spike machines, and 4 rivet machines; product, spike and rivet iron; average annual product, 3,000 net tons.

Number of mills in Philadelphia: 11. Total in Eastern Pennsylvania: 53. Of these 12 roll rails, 5 making only light T rails, and 1 only street rails.

CENTRAL DISTRICT.

Altoona Iron Works, Altoona Iron Co., Altoona, Blair county. First put in operation in April, 1873; 1 double and 6 single puddling furnaces, 3 heating furnaces, 3 trains of rolls (one 8, one 16, and one 18-inch), and 1 rotary squeezer; product, bar, band, and hoop iron; annual capacity, 6,000 net tons. S. C. Baker, President, and A. H. Voris, Treasurer.

Berwick Rolling Mill, Berwick Rolling Mill Co., Berwick, Columbia county. Built in 1872; 5 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls; product, bar iron; annual capacity, 3,600 net tons. C. G. Jackson, President, and C. R. Woodin, Vice-President.

Central Iron Works, Harrisburg, Dauphin county. Built in 1853; 4 single puddling furnaces, 2 heating furnaces, 1 20-inch train of rolls, and 1 hammer; product, boiler-plate and tank iron; annual capacity, 3,500 net tons. Charles L. Bailey, President; A. Wilhelm, Vice-President; Samuel R. Matlack, Secretary, and G. M. McCauley, Treasurer.

Chesapeake Nail Works, Chas. L. Bailey & Co., Harrisburg, Dauphin county. Built in 1867; 14 single puddling furnaces, 3 heating furnaces, 2 trains of rolls (20-inch puddle, and 16-inch plate), and 66 nail machines; product, nails; annual capacity, 7,500 net tons.

Chickies Rolling Mill, Becker & Reinhold, Chickies, Lancaster county. Built in 1865; 1 single and 3 double puddling furnaces, and 2 trains of rolls (9 and 16-inch); product, muck bar; annual capacity, 4,000 net tons.

Codorus Steel Works, York County Iron and Steel Co., York, York county. Built in 1869; 10 single puddling furnaces, 2 heating furnaces, 2 trains of rolls, and 1 hammer; product, principally puddled steel for heading iron rails; annual capacity, 7,500 net tons. Not in operation in 1875 and 1876.

* Columbia Steel and Iron Works, Maitland, Audenreid & Co., Columbia. Office, N. E. corner Third and Dock Streets, Philadelphia. Built in 1854; product, rails, bars, and rods.

* Co-operative Iron and Steel Works, Danville, Montour county. Built in 1871; 8 single puddling furnaces, 4 heating furnaces, and 2

trains of 18-inch rolls; product, all sizes of T rails from 16 to 65 lbs. per yard; street rails a specialty; annual capacity, 10,000 net tons. The machinery is fitted for 25,000 tons, needing only additional heating furnaces. M. J. Grove, President, and L. K. Rishel, Secretary, Treasurer and Manager.

Crescent Iron and Nail Works, E. G. Heylmun, Cogan Station, Lycoming county. Built in 1842; 2 single puddling furnaces, 1 heating furnace, 1 train of rolls, and 7 nail machines; water-power; product, bar iron and nails.

*Danville Iron Works, William Faux, Danville. Built in 1870; 4 heating furnaces, and 1 train of 16-inch rolls; product, T rails from 16 to 56 lbs. per yard, inclusive; annual capacity, 11,000 net tons.

Duncannon Iron Company, Duncannon, Perry county. Office, 122 Race Street, Philadelphia. Built in 1838; 11 single puddling furnaces, 5 heating furnaces, 4 trains of rolls, and 52 nail machines; steam and water power; product, bar iron and nails. William Wister, President; John Wister, Treasurer, and William E. S. Baker, Secretary and Assistant Treasurer. *See Upper Susquehanna Furnaces.*

Eagle Iron Works, C. Curtin & Co., Roland, Centre county. Built in 1810; 1 single puddling furnace, 1 heating furnace, 2 trains of rolls, and 1 squeezer; water-power; product, bar iron, boiler covers, and assorted iron from ½-inch round and square to 4½-inch tire; annual capacity, 2,000 net tons. *See Charcoal Furnaces. See Bloomaries.*

*Hancock Steel and Iron Co., Danville, Montour county. Built in 1847; product, rails. Formerly owned by National Iron Co., and afterwards by Hancock, Creveling & Co. Benjamin G. Welch, Secretary. *See Upper Susquehanna Furnaces.*

Harrisburg Nail Works, Harrisburg. Works at West Fairview, Cumberland county. Built in 1810; 9 double puddling furnaces, 6 heating furnaces, 2 trains of rolls, and 73 nail machines; steam and water power; product, nails and muck bars; annual capacity, 7,500 net tons of nails, and 2,000 tons of muck bars. Henry McCormick, Treasurer.

*Hollidaysburg Iron Works, Hollidaysburg Iron and Nail Co., Hollidaysburg, Blair county. Built in 1860; 8 single puddling furnaces, 3 heating furnaces, 3 trains of rolls, and 18 nail machines; product, bars, light T rails, and nails; annual capacity, 3,500 net tons. J. W. Bracken, President, and B. M. Johnston, Treasurer. *See Juniata Rolling Mill.*

Howard Iron Works, Lauth, Thomas & Co., Howard, Centre county. Built in 1840; 6 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 16, one 12, and one 8-inch), and 1 rotary squeezer; water-power; product, all sizes merchant bar, band, hoop, and guide iron; annual capacity, 3,600 net tons finished iron. *See Bituminous Furnaces. See Charcoal Furnaces.*

Juniata Rolling Mill, Hollidaysburg Iron and Nail Co., lessees, Hollidaysburg. Built in 1866; 9 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, 30 nail machines, and 1 hammer; product, sheets and nails; annual capacity, 3,500 net tons. *See Hollidaysburg Iron Works.*

*Lackawanna Iron Works, Lackawanna Iron and Coal Co., Scranton, Luzerne county. Commenced in 1840; 113 single puddling furnaces, 35 heating furnaces, and 12 trains of rolls (one 31, one 23¼, two 23, two 22, two 20, three 18, and one 8-inch), and 1 hammer; steam and water power; product, light and heavy railroad iron, merchant bar iron, and car axles; annual capacity, 112,000 net tons of rails, and 13,500 tons of merchant bar iron and car axles. Bessemer steel works added in 1875; two 5-ton converters, 4 cupola furnaces, and 4 spiegel-melting cupolas; first blow made Oct. 23, 1875; first steel rail rolled Dec. 29, 1875. President, Moses Taylor, New York; Secretary, Edward C. Lynde, Scranton, Pa.; and Treasurer, E. F. Hatfield, Jr., 52 Wall Street, New York. *See Upper Susquehanna Furnaces.*

Lancaster Manufacturing Co., C. A. Bitner, Lancaster. Put in operation in April, 1873; 8 single puddling furnaces, 3 heating furnaces, 3 trains of rolls (one 18-inch puddle, one 16-inch bar, and one 8-inch guide), and 2 hammers; product, bar iron, splice bar, axles, bolts, spikes and forgings; annual capacity, 3,600 net tons. Not in operation in 1875 and 1876.

Lancaster Rolling Mill, Manuel McShain & Co., Hempfield, Lancaster county. Office, 140 Walnut Street, Philadelphia. Bought by present parties and enlarged in June, 1872; 1 double and 5 single puddling furnaces, 2 heating furnaces, 2 trains of rolls, and 1 hammer; product, merchant bar and guide iron; annual capacity, 3,000 net tons.

Lebanon Rolling Mill, Light & Bro., Lebanon. Built in 1867; 4 double puddling furnaces, 6 heating furnaces, 5 trains of rolls, and 1 hammer; product, plate, sheet, and flue iron, and muck bar; annual capacity, 4,500 net tons.

*Lochiel Rolling Mill Co., Harrisburg. Built in 1865; merchant mill completed in November, 1871; 8 double and 4 single puddling furnaces, 8 heating furnaces for rails, 4 heating furnaces for the merchant mill, and 4 trains of rolls (one 16 and three 18-inch); product, rails from 15 lbs. per yard upward, bar iron and splice bars; annual capacity, 25,000 net tons rails, and 3,000 tons merchant iron and splice bars. Henry McCormick, President, and A. J. Dull, General Manager. *See Lower Susquehanna Furnaces.*

Logan Iron Works, Valentine & Co., Bellefonte, Centre county.

Built in 1825; product, bars and rods. *See Charcoal Furnaces. See Bloomaries.*

Logan Works, Logan Iron and Steel Co., Lewistown, Mifflin county. Office, 218 South Fourth Street, Philadelphia. Built in 1869; forge very old; 3 single puddling furnaces, 3 heating furnaces, 1 train of rolls, 1 steam hammer, 3 water hammers; steam and water power; product, hammered and rolled bar, and blooms. The Company has a plate mill not now in use, containing one 30-inch train of rolls, 3 heating furnaces, etc. Another part of the establishment, comprising a large steam hammer and a tire mill, is rented to the Standard Steel Works. President, John M. Kennedy; Secretary, C. Weston, Jr.; Treasurer, H. T. Townsend, and Superintendent, R. H. Lee. *See Charcoal Furnaces. See Bloomaries.*

Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Built in 1830; 3 single puddling furnaces, 2 heating furnaces, 3 trains of rolls, and 2 hammers; steam and water power; product, all sizes bar iron, spring and soft rods, and spring and soft wire of all numbers; annual capacity, 3,000 net tons. *See Charcoal Furnaces. See Bloomaries.*

Milton Nail Works, C. A. Godcharles & Co., Milton, Northumberland county. Built in 1875; put in operation Oct. 28, 1875; 5 single puddling furnaces, 1 heating furnace, 16 nail machines, and one 20-inch train of rolls; product, nails.

Milton Rolling Mill, Milton Iron Co., Milton, Northumberland county. Put in operation December 1, 1872; 6 puddling furnaces, 1 heating furnace, and 3 trains of rolls; product, round, square, and flat bar iron; annual capacity, 2,000 net tons. W. A. Schreyer, President, and P. C. Johnson, Treasurer.

Northumberland Iron and Nail Works, Van Alen & Co., Northumberland, Northumberland county. Built in 1867; 7 single puddling furnaces, 1 heating furnace, 1 train of rolls, and 21 nail machines; product, nails, nail plate, muck and scrap bars; annual capacity, 5,500 net tons muck bar, 4,000 tons nail plate, 2,500 tons nails.

Paxton Rolling Mills, McCormick's Estate, Harrisburg. Built in 1869; 5 double puddling furnaces, 5 heating furnaces, 3 trains of rolls, and 1 hammer; product, boiler, skelp, and tank iron; annual capacity, 8,750 net tons. John Q. Denny, Manager.

* Pennsylvania Iron Works, Waterman & Beaver, Danville. Office, 407 Library Street, Philadelphia. Built in 1845; 22 double and 16 single puddling furnaces, 15 heating furnaces, 4 trains of rolls, and 1 hammer; product, railroad iron; annual capacity, 40,320 net tons. *See Upper Susquehanna Furnaces.*

* Pennsylvania Steel Works, Pennsylvania Steel Co., Steel Works P. O., Baldwin Station, Dauphin county. Office, 216 South Fourth Street, Philadelphia. Bessemer steel works built in 1865–7; made

their first blow in June, 1867; two 5-ton converters; rolling mill built in 1867–8, and since enlarged; hammer mill contains 6 and 12-ton hammers, the larger turning out 75 to 80 tons of blooms and forgings every 24 hours; 2 Siemens open-hearth steel furnaces; product, steel ingots, forgings, rails of heavy sections, street rails, and railroad axles, crossings, frogs, and switches. S. M. Felton, President; E. F. Barker, Secretary; H. C. Spackman, Treasurer; C. S. Hinchman, Sales Agent, and Luther S. Bent, Superintendent. *See Lower Susquehanna Furnaces.*

Portage Iron Works, John Musselman, Duncansville, Blair county. Built in 1839; 8 single puddling furnaces, 2 heating furnaces, 4 trains of 18-inch rolls, and 37 nail machines; product, nails; annual capacity, 4,600 net tons.

* Safe Harbor Rolling Mill (Phœnix Iron Co., owners, 410 Walnut Street, Philadelphia), Safe Harbor, Lancaster county. Built in 1848; 16 double and 2 single puddling furnaces, 8 heating furnaces, and 2 trains of rolls; product, railroad iron; has made 12,000 net tons of rails a year; has not made any rails since 1861, and the mill has not been in operation since 1865, but it has not been abandoned. *See Lower Susquehanna Furnaces.*

Susquehanna Iron Works, Susquehanna Iron Co., Columbia. Three heating and 12 single puddling furnaces; product, bar iron. Wm. Patton, Treasurer and Superintendent, and T Masterson, Secretary.

Towanda Iron Manufacturing Co., Towanda, Bradford county. First started in November, 1872; 3 double puddling furnaces, 3 heating furnaces, 24 nail machines, and 2 trains of rolls (15-inch puddle and 15-inch plate); product, nails; annual capacity, 1,500 net tons.

Valentine Iron Co., Williamsport, Lycoming county. Built in 1873–4; 4 single puddling furnaces, 2 heating furnaces, 8 forge fires, 1 hammer, and 3 trains of rolls (one 8 and two 15-inch); product, charcoal blooms, bars, and wire rods; annual capacity, 4,000 net tons. Mahlon Fisher, President, and E. M. Valentine, Agent.

Van de Sand & Capp, Lebanon. Product, bar iron.

Number of mills in Central Pennsylvania: 37. Of these, 10 roll rails, 1 making light T rails only.

WESTERN DISTRICT.

Allegheny and Monongahela Iron Works, Lewis, Oliver & Phillips, Pittsburgh, Allegheny county. Built in 1866 and 1864, respectively; 60 single puddling furnaces, 12 heating furnaces, 2 rotary squeezers, and 8 trains of rolls (two puddle, two 16-inch bar, one 10-inch bar, and three 8-inch bar trains); product, bar iron, round, square and oval, bands, and peculiar and odd shapes, bolts, nuts, washers, hinges, and other wrought iron hardware; annual capacity, 40,000 net tons.

* American Iron Works, Jones & Laughlins, Pittsburgh. Built in

1852; 75 single puddling furnaces, 30 heating furnaces, 18 trains of rolls, and 73 nail machines; product, bars, nails, hoops, railroad spikes, plates, sheets, cold-rolled shafting, and 8 to 40-lb. T rails; annual capacity, 50,000 net tons.

Anchor Nail and Tack Works, Chess, Smyth & Co., Pittsburgh. Built in 1837; 20 single puddling furnaces, 5 heating furnaces, 4 trains of rolls, 90 nail machines, 50 tack machines, and 1 hammer; product, nails, tacks, and brads; annual capacity, 6,000 net tons.

Apollo Iron Works, Rogers,. Laufman & Co., Apollo, Armstrong county. Built in 1850; 9 single puddling furnaces, 5 heating furnaces, and 6 trains of rolls; product, sheet iron; annual capacity, 3,000 net tons.

Atlantic Iron and Nail Works, Kimberly, Carnes & Co., Sharon, Mercer county. 28 puddling furnaces, 6 heating furnaces, and 40 nail machines; product, bar, plate, hoop, and rod iron, and nails; annual capacity, 8,000 net tons. *See Shenango Valley Furnaces.*

Birmingham Iron Works, McKnight, Duncan & Co., Pittsburgh. Built in 1836; 20 single puddling furnaces, 5 heating furnaces, and 5 trains of rolls; product, merchant bar iron, rounds, squares, ovals, half ovals, bands, hoops, etc.; annual capacity, 10,000 net tons. In hands of assignees.

*Brady's Bend Iron Co., Brady's Bend, Armstrong county. Office, 54 Cliff Street, New York. Built in 1842; under present management from 1862; 28 single puddling furnaces, 12 heating furnaces, and 3 trains of rolls; product, railroad iron; annual capacity, 20,000 net tons. Geo. M. Wheeler, President, New York. Not in operation since October, 1873. *See Bituminous Furnaces.*

Byers, McCullough & Co., Pittsburgh. Built in 1862–3; 26 puddling furnaces, 6 heating furnaces, 1 scrap furnace, and 3 trains of rolls (one 16, one 18, and one 20-inch); also a pipe mill, to make butt-welded gas, steam and water pipe, and a galvanizing department; product, bars, plates, sheets, shafting and skelp iron; annual capacity, 15,000 net tons.

*Cambria Iron Works, Cambria Iron Co., Johnstown, Cambria county. Office, 218 South Fourth Street, Philadelphia. Built in 1853; 42 double puddling furnaces, 28 heating furnaces, 1 hammer, and the following trains of rolls: 21-inch rail mill, 5 sets; 18-inch rail mill, 2 sets; 12-inch rail mill, 3 sets; 16-inch merchant mill, 3 sets; 22-inch puddle mill, 6 sets; 21-inch puddle mill, 6 sets, and 30-inch blooming mill, 1 set. Total, 26 sets. Bessemer steel works completed in 1871; made their first blow July 10, 1871; two 5-ton converters, and all the appliances for making steel rails. Product, iron and steel rails; total capacity per annum, 100,000 gross tons. E. Y. Townsend, President; Dr. Charles Stewart Wurts, Vice-President; John T. Killé, Secretary and Treasurer; D. J. Morrell, General Manager. *See Bituminous Furnaces.*

Clinton and Millvale Rolling Mills, Graff. Bennett & Co., Pittsburgh. Built about 1841; 41 single puddling furnaces, 6 Danks puddling machines; 17 heating furnaces, 10 trains of rolls, 41 nail machines, and 1 hammer; product, bars, sheets, plates and nails; annual capacity, 20,000 net tons. *See Allegheny County Furnaces.*

Eagle Rolling Mill, Mullen & Maloney, Pittsburgh. Built in 1825; 31 single puddling furnaces, 14 heating furnaces, 42 nail machines, and 7 trains of rolls (two 20-inch muck, one 16-inch bar, one 20-inch nail plate, one 8 and one 10-inch guide, and one 3-high bar): product, bar iron and nails; annual capacity, 10,000 net tons. Nail mill not used in 1876. Formerly owned by James Wood's Sons & Co.

*Edgar Thomson Steel Works, Edgar Thomson Steel Company, Limited, Bessemer Station, Allegheny county. Branch office, 41 Fifth Avenue, Pittsburgh. Began operations about Sept. 1, 1875; two 5-ton converters; 3 cupolas, 40 x 5; 4 spiegel cupolas, 40 x 2; two 12-ton cupola ladles; 16 tubular boilers, 15 x 5; hydraulic lifting machinery; 20 gas producers, and 6 Siemens heating furnaces; 30-inch, 3-high blooming mill, and 23-inch, 3-high rail train; machine and smith shops attached; product, Bessemer steel rails. First blow made on August 26, 1875, and first rail rolled on Sept. 1, 1875. D. McCandless, Chairman; Wm. P. Shinn, Sec., Treas. and Gen. Manager; and Wm. R. Jones, General Superintendent.

Erie Rolling Mill, Erie Rolling Mill Co., Erie, Erie county. Put in operation November 1, 1874; 11 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls (one 8, one 10, and one 15-inch); product, bar iron; annual capacity, 6,000 net tons.

Etna Iron Works, Limited (Kimberly & Co., owners), New Castle, Lawrence county. Began operations November 1, 1874; 2 double and 15 single puddling furnaces, 5 heating furnaces, 53 nail machines, and 4 trains of rolls (two 18, one 16, and one 8-inch); product, nails and guide iron. *See Shenango Valley Furnaces.*

Etna Rolling Mill, Spang, Chalfant & Co., Pittsburgh. Built in 1828; new mill added in 1873–4; old mill has 24 single puddling furnaces, 9 heating furnaces, and 4 trains of rolls (one 8, one 12, one 16, and one 18-inch); new mill has 5 Siemens puddling furnaces, 1 Siemens heating furnace, and 2 trains of rolls; product, sheets, plates, rods, and tubing.

*Fort Pitt Iron and Steel Works, Reese, Graff & Woods, Pittsburgh. Organized in 1862; 22 puddling furnaces, 15 heating furnaces, 7 hammers, 1 fusing disc, two 24-pot Siemens steel-melting furnaces, 4 shingle-strip machines, 2 horse-shoe machines, and 7 trains of rolls (22-inch muck train, 22-inch sheet-steel train, 12-inch steel train, 9-inch steel train, 16-inch bar, 8-inch guide, and 8-inch hoop); also a spring factory, with full set of machinery for making spiral springs for railroad cars; product, plates, sheets, guide iron, bar iron, light T rails, and German and cast steel; annual capacity, 12,000 net tons merchant iron, 1,000 tons tool steel, and 4,000 tons of special steel, German steel, and iron-centre cast steel for agricultural purposes.

Glendon Rolling Mill, Dilworth, Porter & Co., Pittsburgh. Built in 1857; 24 single puddling furnaces, 4 heating furnaces, 9 railroad spike machines, and 5 trains of rolls (two 8, one 10, and two 16-inch); product, railroad and marine spikes, railroad chairs, and fish bars and bolts; annual capacity, 10,500 net tons.

Greenville Rolling Mill, Greenville, Mercer county. Built in 1871; 2 double and 5 single puddling furnaces, 2 heating furnaces, and 3 trains of rolls (one 8 and two 16-inch); product, bar and hoop iron, principally hoop; annual capacity, 5,000 net tons.

Juniata Iron Works, Shoenberger & Co., Pittsburgh. Built in 1824 and 1857; 29 single puddling furnaces, 8 heating furnaces, 1 annealing furnace for sheet iron, 1 pair heating furnaces for sheet iron, 6 furnaces for heating nail plates, 1 furnace for annealing nails, 8 hammers, and 6 trains of rolls (2 trains muck, one 16-inch bar, one 8-inch bar, one sheet train, and one nail-plate train), and 92 nail machines; product, nails, sheet and plate iron, horse and mule shoes, and horse-shoe bar; annual capacity, 18,000 net tons.

* Kensington Rolling Mill, H. Lloyd, Son & Co., Pittsburgh. Built in 1828; 16 single puddling furnaces, 6 heating furnaces, and 4 trains of rolls; product, bar, sheet and plate iron, flat rails, and T rails from 12 to 30 lbs. to the yard; annual capacity, 6,000 net tons.

Keystone Iron Works, Glass, Neely & Co., Pittsburgh. Built in 1865; 19 single puddling furnaces, 1 scrap and 5 heating furnaces, and 4 trains of rolls; product, all sizes round, square, and flat bar iron, hoop, plate, and sheet iron; annual capacity, 11,000 net tons.

Leechburgh Iron Works, Leechburgh, Armstrong county. Built in 1872; 6 single puddling furnaces, 6 heating furnaces, 6 trains of rolls, 2 steam hammers, 1 refinery, and 2 knobbling fires. These works once belonged to Rogers & Burchfield, but were in the hands of assignees in 1876; they were run with gas for fuel from a well 1,200 feet deep, the gas furnishing all the fuel needed for all purposes. Product, tin plates and charcoal terne plates; annual capacity, 3,000 net tons.

McKeesport Iron Works, Wm. D. Wood & Co., Pittsburgh. Works at McKeesport, Allegheny county. Built in 1851; 10 forge fires, 7 single puddling furnaces, 16 heating furnaces, 4 trains of rolls, and 4 hammers; product, sheet iron, both common American and planished in imitation of Russian; annual capacity, 4,000 net tons.

Middlesex Rolling Mill, Wheeler Iron Co., Sharon, Mercer county. Works put in operation June 1, 1873; 10 single puddling furnaces. 1 heating furnace, and 2 trains of rolls (one 10 and one 18-inch); product, merchant bar iron; annual capacity, 5,000 net tons. *See Shenango Valley Furnaces.*

Newcastle Iron Works, Bradley, Reis & Co., New Castle, Lawrence county. Built in 1873; 10 single puddling furnaces, 5 heating furnaces, 3 trains of rolls, and 1 hammer; product, light and heavy sheet iron, from hammered blooms; annual capacity, 6,000 net tons.

*Old Fort Iron Works, Jacobs & Jackson, Brownsville, Fayette county. Completed December 1, 1873; 6 single puddling furnaces, 3 heating furnaces, 2 trains of rolls, 2 spike and bolt machines, 2 hammers, and 1 squeezer; product, bar iron, light T rails, car axles, and general forgings, spikes and bolts; yearly capacity, 9,000 net tons.

Ormsby Iron Works, Wharton, Brothers & Co., Pittsburgh. Built in 1863; 20 puddling furnaces, 5 heating furnaces, and 4 trains of rolls (one 8, one 10, and two 16-inch); product, bar, rod, guide, and hoop iron; annual capacity, 14,000 net tons. Paul Jones, Assignee.

Pennsylvania Iron Works, Everson, Macrum & Co., Pittsburgh. Built in 1844; 14 puddling furnaces, 8 heating furnaces, and 5 trains of rolls (2 sheet, 1 bar, 1 guide, and 1 muck train); product, bar, sheet, and guide mill iron; annual capacity, 6,000 net tons. *See Scottdale Rolling Mill.*

Pittsburgh Bolt Works, Pittsburgh Bolt Co., Pittsburgh. 24 single puddling furnaces, 7 heating furnaces, and 6 trains of rolls (one 8, one 10, and four 18-inch); product, nuts, bolts, and railroad supplies; annual capacity, 15,000 net tons. E. Kaylor, President, and H. F. Lynch, Secretary. In hands of assignees.

Pittsburgh Forge and Iron Co., Pittsburgh. Built in 1864; 15 single puddling furnaces, 7 heating furnaces, 3 trains of rolls, and 3 hammers; product, (1) bar, rod, band, hoop, oval and half oval iron, fish plates, and track bolts, and (2) hammered car and locomotive axles, railroad, steamboat and machine forgings; capacity yearly, (1) 13,000 net tons, (2) 2,000 tons. W. W. Speer, President, and Jas. H. Murdoch, Secretary and Treasurer.

Pittsburgh Iron Works, Jacob Painter & Sons, Pittsburgh. Built in 1833; 52 single puddling furnaces, 15 heating furnaces, and 13 trains of rolls (six 8-inch, three 10, one 12, one 16, and two 20-inch); product, principally oil, whisky, and trunk hoops, also hoops for pails, tubs, and wooden ware, cotton ties, lock iron, stone saws, merchant bands, and hinge iron; annual capacity, 24,000 net tons.

Sable Iron and Nail Works, Zug & Co., Pittsburgh. Built in 1845; 34 single puddling furnaces, 11 heating furnaces, 6 trains of rolls, and 55 nail machines; product, merchant bar iron, including heavy sizes flat bars and squares made by the "universal" rolls, and nails; annual capacity, 18,000 net tons.

Scottdale Rolling Mill, Everson, Macrum & Co., Pittsburgh. Works at Scottdale, Westmoreland county. Built in 1873; 11 single puddling furnaces, 4 heating furnaces, and 3 trains of rolls; product, muck bar and sheet iron; annual capacity, 5,000 net tons. *See Pennsylvania Iron Works.*

*Sharon Rolling Mills, Westerman Iron Co., Sharon, Mercer county. Built in 1862; 29 single puddling furnaces, 12 heating furnaces, 7 trains of rolls, and 46 nail machines; product, bar, hoop, and sheet iron, railroad and boat spikes, light T rails and nails; annual capacity, 15,000 net tons. *See Shenango Valley Furnaces.*

*Shenango Iron Works, Reis, Brown & Berger, New Castle, Lawrence county. Built in 1848; 27 single puddling furnaces, 9 heating furnaces, 5 trains of rolls, and 55 nail machines; product, bars, light T rails, sheets, bands, wrought spikes, and nails; annual capacity, 15,000 net tons. *See Shenango Valley Furnaces.*

*Sligo Iron Works, Phillips, Nimick & Co., Pittsburgh. Built in 1825; 27 puddling furnaces, 10 heating furnaces, 2 hammers, and 5 trains of rolls (one 12, one 16, one 18, one 24, and one 30-inch); product, bar, sheet, and plate iron, light T rails, and puddled steel; fire-box iron a specialty; make "Sligo" bars, and "Tyrone" refined iron; annual capacity, 16,000 net tons.

Soho Iron Mills, Moorhead & Co., Pittsburgh. Built in 1859; 12 knobbling fires, 11 single puddling furnaces, 6 heating furnaces, 4 sheet furnaces, 3 pair furnaces, 5 trains of rolls (1 muck, and 4 sheet trains), and 1 hammer; product, sheet and plate iron; annual capacity, 10,000 net tons.

Solar Iron Works, Wm. Clark & Co., Pittsburgh. Built in 1869; 17 single puddling furnaces, 5 heating furnaces, and 5 trains of rolls (one 7, two 8, one 12, and one 18-inch); product, hoop, band, and scroll iron; annual capacity, 6,000 net tons.

Star Iron Works, Lindsay & McCutcheon, Allegheny City, Allegheny county. Built in 1862; 14 puddling furnaces, 4 heating furnaces, and 4 trains of rolls; product, hoop iron of all sizes; annual capacity, 8,000 net tons.

Stewart Iron Works, Stewart Iron Co., Sharon, Mercer county. Built in 1870; 16 single puddling furnaces, 1 hammer, and 2 trains of 18-inch rolls; product, muck bar and blooms; annual capacity, 9,000 net tons. David Stewart, 119 Broadway, New York City, President; Fayette Brown, Cleveland, Ohio, General Agent; Theo. F. Hicks, Secretary, New York City; G. P. Lloyd, Treasurer, New York City; and Thos. E. Blunt, Manager. *See Shenango Valley Furnaces.*

*Superior Rolling Mill, Harbaugh, Mathias & Owens, Pittsburgh. Built in 1865; product, rails. In hands of assignees. *See Allegheny County Furnaces.*

Union Forge and Iron Mills, Wilson, Walker & Co., Pittsburgh. Built in 1862; 15 single puddling furnaces, 6 heating furnaces, 4 hammers, and 5 trains of rolls (one 18, one 15, and one 10-inch, and 2 "universal" plate trains); product, railroad specialties and bridge work, angles, and peculiar shapes, and bar iron; annual capacity, 9,000 net tons.

Union Iron Mills, Carnegie Brothers & Co., Pittsburgh. Built in 1862; 21 single puddling furnaces, 10 heating furnaces, 7 trains of rolls, and 1 hammer; product, beams, channels, tees, angles, plates, and bar iron; annual capacity, 27,000 net tons.

United States Iron and Tin Plate Works, U. S. Iron and Tin Plate Co., 124 First Avenue, Pittsburgh. Works at McKeesport, Allegheny county. Built in 1873–4; 3 double puddling and 2 heating furnaces, 4 knobbling fires, 2 double sheet-mill furnaces, 2 annealing furnaces, 3 tinning stacks in operation and 1 in course of erection, 1 hammer, and 1 train of bar rolls, 2 trains of sheet rolls, and 3 sets of cold rolls; product, tin and terne plates, and odd sizes of common and charcoal polished black plates; specialty, stamping iron and show-card iron. J. H. Demmler, President; H. H. Demmler, Treasurer; W. C. Cronemeyer, Secretary, and John Coles, Superintendent.

Valley Rolling Mill, Colwell, Mosgrove & Co., Kittanning, Armstrong county. Built in 1848; 16 single puddling furnaces, 5 heating furnaces, 3 trains of rolls, 22 nail machines, and 1 squeezer; product, rod and sheet iron, nails, and spikes; annual capacity, 7,000 net tons. Idle since March, 1873.

Vesuvius Iron Works, Lewis, Dalzell & Co., Pittsburgh. Built in 1846; 24 single puddling furnaces, 10 heating furnaces, 6 trains of rolls, and 50 nail machines; product, bar, sheet and tank iron, rods, hoops, and nails; annual capacity, 12,000 net tons.

*Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Built in 1825; 28 puddling furnaces, 9 heating furnaces, 5 trains of rolls, 2 steam hammers, 24 steel-melting holes, and two 45-ton converting furnaces. Product: Iron—bars, rods, hoops, sheets, light T rails, splice bars, boiler plate and rivets. Steel—cast, German, and "U. S." refined. Annual capacity, 10,000 net tons of iron, and 3,500 net tons of steel.

*Wheatland Rolling Mills, Trustees of J. T. & C. A. Wood, Wheatland, Mercer county. Built in 1872; 12 double puddling furnaces, 14 heating furnaces, and 3 trains of rolls; product, rails, bars, and sheet iron; annual capacity, 45,000 net tons. Not in operation in 1875 and 1876.

Number of mills in Pittsburgh and Allegheny county: 32. Total number of mills in Western Pennsylvania: 48. Of these, 13 roll rails, 8 making only light rails. Total number of mills in Pennsylvania: 138. Of these, 35 roll rails, 14 making only light rails, and 1 only street rails.

POST 58, G.A.R.

BESSEMER STEEL WORKS.

A COMPLETE LIST OF ROLLING MILLS IN PENNSYLVANIA WHICH MANUFACTURE BESSEMER STEEL.

[For a complete description of the works enumerated below, see the preceding list of rolling mills.]

Bethlehem Rolling Mill, Bethlehem Iron Co., Bethlehem, Pa. Two five-ton converters.

Cambria Iron Works, Cambria Iron Co., Johnstown, Pa. Office, 218 South Fourth Street, Philadelphia. Two five-ton converters.

Edgar Thomson Steel Works, Edgar Thomson Steel Co., Limited, Bessemer Station, Allegheny county, Pa. Branch office at Pittsburg. Two five-ton converters.

Lackawanna Iron Works, Lackawanna Iron and Coal Co., Scranton. Pa. Two five-ton converters.

Pennsylvania Steel Works, Pennsylvania Steel Co., Baldwin Station, near Harrisburg, Pa. Office, 216 South Fourth Street, Philadelphia, Two five-ton converters.

Number of Bessemer steel works: 5 works, containing ten five-ton converters.

STEEL WORKS.

[Except Bessemer.]

Beaver Falls Steel Works, Abel & Pedder, Beaver Falls, Beaver county. Built in 1875; one Siemens 24-pot gas furnace, one gas converting furnace, 2 steam hammers, and 2 trains of rolls (one 16 and one 19-inch); water power; product, spring, bar, plane, file, axe, tool, cutlery, and agricultural steel.

Black Diamond Steel Works, Park, Brother & Co., Pittsburgh. Established in May, 1862; 6 single puddling furnaces, 48 heating and annealing furnaces, 6 trains of rolls (one 8, one 10, one 12, one 16, one 18, and one 28-inch), 21 hammers, 6 steel-cementing furnaces, 72 steel-melting holes, and two 24-pot gas furnaces; product, all varieties of steel; annual capacity, 10,000 net tons.

Blair Iron and Steel Co., Pittsburgh. Works at Glenwood, on the Monongahela River and Connellsville Railroad, 5 miles from Pittsburgh. Iron sponge is made from ore by Thomas S. Blair's direct process, and steel ingots are made with sponge in one 5-ton Siemens open-hearth furnace. Product of works is in steel ingots; capacity

60 net tons per week. There are 5 Blair sponge furnaces, 1 Siemens furnace, 2 heating furnaces, hydraulic machinery, etc.

Chester Steel Castings Co., Chester, Delaware county. Built in 1871; one cupola, and 5 annealing furnaces; product, steel castings, by the McHaffie process; annual capacity, 300 net tons. Frederick Baldt, Manager.

Codorus Steel Works, York County Iron and Steel Co., York, York county. Product puddled steel. *See Rolling Mills.*

Crescent Steel Works, Miller, Metcalf & Parkin, Pittsburgh. Built in 1867; 8 heating furnaces, 2 trains of rolls (one 12 and one 9-inch), 3 steel-cementing furnaces, 24 steel-melting holes, and four 24-pot Siemens melting furnaces, and 6 hammers; product, hammered and rolled bar steel, and cast, spring, and edge-tool steel; annual capacity, 4,000 net tons.

Crucible Cast Steel Casting Co., Limited, Pittsburgh. Built in 1875; 3 steel-cementing furnaces, and 8 steel-melting holes; product, cast steel castings; annual capacity, 600 net tons. J. F. Denniston, Secretary and Treasurer.

Duquesne Steel Works, J. S. Liggett, Spruce and Market Streets, Pittsburgh. Built in 1865; one converting furnace, 2 hammers, 5 heating furnaces, and one train of rolls; product, blister steel.

Fairmount Steel Works, Alexander Foster & Co., Twenty-fourth Street and Pennsylvania Avenue, Philadelphia. Built in 1866; 3 heating furnaces, six 4-pot melting furnaces, and 3 steam hammers; product, machinery steel, frog plates and points, cast spring steel, and all kinds of steel forgings; annual capacity, 750 net tons.

Fort Pitt Iron and Steel Works, Reese, Graff & Woods, Pittsburgh. Product, cast steel. *See Rolling Mills.*

Hussey, Binns & Co., Pittsburgh. Steel plant built in 1875; one 24-pot Siemens furnace; product, cast steel, used by the firm in making shovels.

Hussey, Howe & Co., Pittsburgh. Built in 1859; 16 single puddling furnaces, 20 heating furnaces, 10 steam hammers, 3 tilt hammers, 75 2-pot coke steel furnaces, 6 24-pot Siemens furnaces, and 8 trains of rolls (one 9, one 12, three 16, two 18, and one 28-inch); product, crucible cast steel, in bars, sheets, rods, plates, and forgings of all kinds; annual capacity, 13,000 net tons ingots.

Kensington Iron and Steel Works, James Rowland & Co., 920 North Delaware Avenue, Philadelphia. Product, steel from steel scrap. *See Rolling Mills.*

Keystone Saw, Tool, Steel and File Works, Henry Disston & Sons, Front and Laurel Streets, Philadelphia. Branch Works at Tacony, Philadelphia. Founded in 1840, and commenced the manufacture of steel in 1854; now running 42 melting furnaces, 2 trains of rolls, 6 heating furnaces, and 1 hammer; product, principally saw steel of every description, also tool steel, homogeneous steel, steel for engravers' plates, etc.; annual capacity, 2,500 net tons.

La Belle Steel Works, Smith, Sutton & Co., Pittsburgh. Built in 1863; four 25-ton converting furnaces, 4 open-hearth refining furnaces, 4 puddling furnaces, 7 heating furnaces, 12 cast-steel melting furnaces, 5 hammers, and 3 trains of rolls (one 20, one 16, and one 10-inch); product, cast and German plow steel, agricultural steel of every description, cast and German spring steel, cast machinery steel, cast tool steel, and cast and German steel tire; also, finished springs and iron and steel axles; annual capacity, 6,000 net tons.

Midvale Steel Works, Nicetown P. O., Philadelphia. Built in 1866; one 4-ton air furnace for melting pig, and 11 coal and 3 gas heating furnaces; one gas pot muffle and one kiln for drying; moulding and annealing shop, with 2 annealing, and 4 drying furnaces; 5 steam hammers, from 8 tons to 300 lbs.; tire rolling mill, with capacity for 30 tires a day; machine shop, with five 80-inch boring and turning mills, two 80-inch and four 24-inch lathes, and one planer, 36 inches by 10 feet; one 30-ton converting furnace, with a yearly capacity of 500 net tons, fifty 4-pot steel melting holes, one 30-pot Siemens gas melting furnace, one 6-ton Siemens open-hearth furnace, and one 4-ton Sellers open-hearth melting furnace; product, axles, tires, and tool, machinery, spring and frog steel, and all kinds of castings and forgings; daily capacity, 40 net tons, and yearly capacity, 12,000 net tons, of cast steel. William Sellers, President; Marriott C. Smyth, Secretary, and C. A. Brinley, Superintendent.

Oxford Iron and Steel Works, William & Harvey Rowland, Frankford P. O., Philadelphia. Product, cast steel and agricultural steel. *See Rolling Mills.*

Pennsylvania Steel Works, Baldwin Station, near Harrisburg. Office, 216 South Fourth Street, Philadelphia. Product, open-hearth and Bessemer steel. *See Rolling Mills.*

Philadelphia Steel Works, William Baldwin, Frankford P. O., Philadelphia. Built in 1865; 4 heating furnaces, 6 steam drop hammers and one tilt hammer, one cementing furnace, not now in use, and 32 steel melting holes; product, cast and shear steel, frog steel, railroad and locomotive forgings, sledges, hammers, tools, etc. Annual capacity, 1,200 net tons.

Pittsburgh Steel Casting Co., Pittsburgh. Built in 1871; 19 steel-melting holes, one 24-pot Siemens furnace, and one Siemens open-hearth furnace of 6 tons daily capacity; product, steel castings. James Irwin, President, and Henry W. Patterson, Treasurer.

Pittsburgh Steel Works, Anderson & Woods, Pittsburgh. Owned exclusively by Robert J. Anderson. Built in 1845; 4 Siemens pot furnaces, 3 sets of coke-hole furnaces, 6 converting furnaces (weekly capacity, 90 net tons), 3 puddling furnaces, 25 heating furnaces, 16 hammers, rake-tooth shop, and 10 trains of rolls (two 20-inch plate, one 16-inch bar, one "universal" train, one 16-inch spring, two 16-inch sheet, and one 8, one 9, and one 10-inch guide); another 20-inch plate train is in course of erection; product, cast and German plow steel, plate steel, and best edge-tool steel; annual capacity, 7,000 net tons.

Pitt Steel Works, C. E. Jones & Co., Pittsburgh. Works at McKees port, Allegheny county. Established in 1875; one 24-pot Siemens furnace, 7 heating furnaces, 2 knobbling furnaces, and 4 hammers; product, tool steel and hammered iron of all kinds; annual capacity, 1,400 net tons steel, and 1,500 tons charcoal blooms and hammered bar iron. *See Bloomaries.*

Sheffield Steel Works, Singer, Nimick & Co., Pittsburgh. Built in 1848. In mill, 6 puddling and 6 knobbling furnaces, one 18-inch train of rolls, and one 4½-ton steam hammer, four 24-pot Siemens gas furnaces, 30 melting furnaces, and one 5-ton open-hearth furnace; annual capacity, 12,000 net tons of cast steel. In steel-converting department, 8 furnaces; annual capacity, 5,500 net tons. In finishing mill, one 22-inch, 3-high sheet and plate train, one 16-inch, and one 10-inch bar train, 11 heating furnaces, and 10 hammers; the new plate mill has 4 sets of 28-inch rolls, 4 sets of 20-inch rolls, and 6 heating furnaces. Product, steel plates, tool steel, saw steel, and all other kinds of steel, carriage springs, and axles.

Standard Steel Works, 218 South Fourth Street, Philadelphia. Works at Logan, near Lewistown, Mifflin county. Built in 1869; 28 4-pot melting holes, 5 heating furnaces, 2 hammers, 1 tire mill, and 4 boring mills; product, crucible cast steel locomotive and car tires, car and carriage axles, forgings, castings, etc. Wm. Burnham, Agent, Philadelphia.

Wayne Iron and Steel Works, Brown & Co., Pittsburgh. Product, cast steel. *See Rolling Mills.*

Number of steel works in Pennsylvania: 25.

OPEN-HEARTH STEEL WORKS.

[For a complete description of the works enumerated below, see the preceding list of steel works.]

Blair Iron and Steel Co., Pittsburgh. One Siemens open-hearth furnace.

Midvale Steel Works, Nicetown, Philadelphia. One Siemens open hearth furnace, and one Sellers open-hearth furnace.

Pennsylvania Steel Co., 216 South Fourth Street, Philadelphia. Two Siemens open-hearth furnaces.

Pittsburgh Steel Casting Co., Pittsburgh. One Siemens open-hearth furnace.

Sheffield Steel Works, Singer, Nimick & Co., Pittsburgh. One Siemens open-hearth furnace.

Total number of open-hearth steel works: 5.

BLOOMARIES.

[Under this title are embraced all works which hammer blooms from pig or scrap iron. There were no works in Pennsylvania in 1876 which make blooms from ore.]

Barre Forge, Estate of A. L. Mumper, Barre Forge, Huntingdon county. Four forge fires; product, charcoal blooms; annual capacity, 900 net tons. *See Charcoal Furnaces.*

Carlisle Iron Works, C. W. & D. V. Ahl, Boiling Springs, Cumberland county. Built in 1791; 5 forge fires and 1 hammer; water-power; product, charcoal blooms; annual capacity, 2,400 net tons. *See Charcoal Furnaces.*

Castle Fin Forge, Assignee of J. M. Bowman, Castle Fin, York county. Four fires and 1 run-out; 2 hammers; water-power; product, charcoal blooms; annual capacity, 1,000 net tons.

Charming Forge, W. & B. F. Taylor, Womelsdorf, Berks county. Works very old; 5 fires, 1 heating furnace, 1 refinery, and 2 hammers; product, blooms and hammered bar iron; annual capacity, 1,000 net tons.

Cold Spring Forge, S. H. Hicks & Brothers, Tyrone, Blair county. Product, blooms. Has made no iron for several years.

Colemanville Forge, Edmund Smith, Colemanville, Lancaster county. Built in 1828; water-power; annual capacity, 500 net tons blooms.

Coleraine Forges, Shorb, Stewart & Co., Coleraine Forges, Huntingdon county.

Cove Forge, John Royer, Royer P. O., Blair county. Two forge fires and one run-out. Product, charcoal blooms; annual capacity, 450 net tons. *See Charcoal Furnaces.*

Cove Forge, Wm. McIlvain & Sons, Duncannon, Perry county. Built in 1864; 5 fires, one refinery and one hammer; blast operated by water-power, and hammer by steam; product, charcoal blooms; annual capacity, 1,200 net tons. *See Eastern Pennsylvania Rolling Mills.*

Eagle Forge, C. Curtin & Co., Roland, Centre county. Built in 1807; 8 fires and 1 hammer; water-power; product, boiler slabs and round blooms; annual capacity, 1,500 net tons. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*

Ellendale Forge, Spang & Wanner, Ellendale Forge, Dauphin county. Rebuilt in 1872; 5 fires, 1 run-out for coke, and 1 hammer; water-power; product, anthracite and charcoal blooms; annual capacity, 1,200 net tons. *See Monroe Forge.*

Ellwood Forge, J. B. Seidel & Sons, Ellwood, Schuylkill county. Built in 1863 by Dr. Geo. N. Eckert, and bought in April, 1874, by present owners; 4 fires and 1 run-out; product, charcoal blooms; annual capacity, 1,250 net tons. *See Perry Forge*

Etna Forge, Geo. D. Isett & Bro., Yellow Springs, Blair county. Four forge fires; product, charcoal blooms. *See Charcoal Furnaces.*

Exeter Forge, Morgan J. Althouse, Jacksonwald, Berks county. Product, blooms.

Franklin and Maria Forges, Assignees of Essington Hammond, Sarah P. O., Blair county. Four forge fires; product, charcoal blooms; annual capacity, 900 net tons. *See Charcoal Furnaces.*

French Creek Iron Works, B. F. Morrct, Pottstown, Montgomery county. Works in Chester county. Built in 1872; product, charcoal, anthracite and scrap blooms.

Juniata Forge, J. R. Hunter & Co., Petersburg, Huntingdon county. Four forge fires and 1 hammer; water-power; product, charcoal blooms; annual capacity, 800 net tons.

Juniata Iron Works, S. & B. R. Hatfield, Alexandria, Huntingdon county. Built in 1837; 4 fires and one 4-tuyere run-out, and a puddling forge, with 3 single puddling furnaces; water-power; product, charcoal blooms, made into boiler plate at the Brandywine Rolling Mills, Coatesville, Pa.; annual capacity, 950 net tons of blooms, and 750 net tons of puddled blooms. *See Eastern Pennsylvania Rolling Mills.*

Knauer & Kauffman, Knauer's P. O., Berks county. One forge.

Liberty Forge, Mumma & Boyer, Lisburn, Cumberland county. Product, blooms.

Logan Forge, Valentine & Co., Bellefonte, Centre county. Product, blooms. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*

Logan Works, Logan Iron & Steel Co., Lewistown, Mifflin county. Office, 218 South Fourth Street, Philadelphia. Forge built about 1810; 4 charcoal fires, 1 run-out for coke, and 2 hammers; steam and water power; product, charcoal blooms. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*

Mainville Forge, C. E. Pennock & Co., Mainville, Columbia county. Built in 1824; 1 hammer, 3 forge fires, and 1 run-out; water-power; product, charcoal blooms; annual capacity, 800 net tons. F. E. Bentz, Supt. *See Eastern Pennsylvania Rolling Mills.*

Martic Forge, Potts & Davis, Colemanville, Lancaster county. Four fires; water-power; product, charcoal blooms; annual capacity, 1,000 net tons.

Mary Ann Forge, Downingtown, Chester county. Built in 1806; 3 fires and 1 hammer; water-power; product, blooms; annual capacity, 720 net tons.

Milesburg Iron Works, McCoy & Linn, Milesburg, Centre county. Built in 1800; product, blooms. *See Charcoal Furnaces. See Central Pennsylvania Rolling Mills.*

Monroe Forge, Spang & Wanner, Union Forge P. O., Lebanon county. Four fires and 1 run-out; water-power; product, anthracite and charcoal blooms; annual capacity, 850 net tons. *See Ellendale Forge.*

Mont Alto Iron Works, Mont Alto Iron Co., G. B. Wiestling, Superintendent, Mont Alto, Franklin county. 7 fires, and a double run-out; Nasmyth steam hammer; product, charcoal blooms and wire billets; annual capacity, 2,000 net tons. I. S. Waterman, President, 407 Library Street, Philadelphia. *See Charcoal Furnaces.*

Mount Airy Forge, Thomas E. Williams, Shartlesville, Berks county. Built about 1840; water-power; product, blooms.

New Market Forge, Light Brothers, Palmyra, Lebanon county. Product, blooms.

North Kiln Forge, Shartlesville, Berks county. Product, blooms. Idle for several years.

Perry Forge, J. B. Seidel & Sons, Marysville, Perry county. Built in 1862; 5 fires, and 1 run-out; water-power; product, charcoal blooms; annual capacity, 1,500 net tons. *See Ellwood Forge.*

Pitt Steel Works, C. E. Jones & Co., Pittsburgh. *See Steel Works.*

Ringwood Forge, Thomas J. Bailey, Penningtonville, Chester county. Very old works; 3 forge fires and 1 run-out; water-power; product, charcoal blooms.

Sadsbury Forge, Charles Goodman & Brother, Penningtonville, Chester county. Works very old; 3 forge fires and 1 run-out; water-power; product, charcoal blooms.

Springton Forge, Cornog & McIlvaine, Wallace, Chester county. Very old works; 4 forge fires and 1 run-out; water-power; product, charcoal blooms.

Tyrone Forges, Lyon, Shorb & Co., Tyrone, Blair county. Built in 1867; 12 forge fires and 1 Scotch hammer; steam and water power; product, charcoal blooms. *See Charcoal Furnaces.*

Union Forge, Spang & Bland, Union Forge, Lebanon county. Very old works; product, blooms; annual capacity, 1,000 net tons.

Washington Forge, Jacob Yearick, lessee, Lamar, Clinton county. Product, blooms. *See Charcoal Furnaces.*

Number of bloomaries in Pennsylvania: 39.

Recapitulation.—The foregoing list of ironworks in Pennsylvania at the beginning of 1876 comprised the following: In the Lehigh valley, 51 blast furnaces; Schuylkill valley, 50; Upper Susquehanna district, 26;

Lower Susquehanna district, 37; one furnace building in the Lower Susquehanna district: total, 164 completed furnaces and one building, using anthracite fuel. In the Shenango valley, 32 blast furnaces; Allegheny county, 11; other parts of the State, 35 bituminous furnaces; one furnace building in Allegheny county, and one in Clarion county: total, 78 completed furnaces and 2 building, using bituminous fuel. In the entire State there were 39 charcoal furnaces. Adding the anthracite, bituminous, and charcoal furnaces, the total number of blast furnaces in the State was 281 completed furnaces and 3 building. The whole number of rolling mills was 138. Of these, 35 rolled rails, 20 making heavy and light rails, 14 making only light T rails, and one making only street rails. Of the rail mills enumerated, 5 made Bessemer steel, and one of these also made open-hearth or Siemens-Martin steel. There were 4 other open-hearth steel works, 3 of which also made crucible cast steel. The whole number of crucible cast steel works was 19. The whole number of works making open-hearth, blister, puddled and crucible cast steel was 25. Of these works, 4 were also iron rolling mills. The number of bloomaries making blooms from pig and scrap iron was 39. Blooms were also largely made in many plate and sheet iron rolling mills for immediate consumption. No blooms were made from iron ore.

COAL MINING IN PENNSYLVANIA.

In the *Statistics of Coal*, by Richard Cowling Taylor (1848), it is stated that the earliest historic mention of coal in this country is by the French Jesuit missionary, Father Hennepin, who, in 1679, saw traces of bituminous coal on the Illinois river. In his journal he marks the site of a "cole mine," above Fort Crevecœur, near the present town of Ottawa. In 1763, nearly a hundred years later, Colonel Croghan, a British officer, noticed on the south side of the Wabash river "a high bank in which are several fine coal mines," which is the earliest reference, says Taylor, to coal in that region. On the map of the Middle Colonies, published by Lewis Evans in 1755, there is mention of coal in Ohio, but no mention of it is made anywhere within the present limits of Pennsylvania. In the map of Captain Hutchins, published in London in 1777, coal deposits are marked at various places in the basin of the Ohio river. But none of these appear to have been worked until several years later. A coal seam near Pittsburgh took fire in 1765, and is said to have burned for sixteen years.

The Virginia coal mines were undoubtedly the first that were worked in America. Mines of bituminous coal were opened and worked on the James river, a few miles from Richmond, probably about 1750. Virginia coal was extensively used during the Revolution. An air-furnace was built at Westham, six miles above Richmond, which used coal in the manufacture of shot and shell for the Revolutionary army until the furnace was destroyed by Benedict Arnold in 1781. Virginia coal was exported to various cities on the Atlantic coast before the Revolution. On the 31st of August, 1776, Thomas Wharton, Jr., and Owen Biddle, of Philadelphia, were authorized to employ proper persons to bring coal from Virginia which had been contracted for by the Committee of Safety. In 1789 Virginia coal sold in Philadelphia at 1s. 6d. a bushel. In 1846 the price at the same city was 20 to 22 cents a bushel, which was two or three cents per bushel higher than Allegheny bituminous coal. It was the scarcity of Virginia coal in the Philadelphia market, especially during the war with Great Britain from 1812 to 1815, which largely contributed in the early part of the present century to the development of the vast coal deposits of Pennsylvania. The exportation of Virginia coal amounted to 42,000 tons in 1822, and it reached its culmination in 1833, when 142,000 tons were shipped to neighboring States. Up to about that year it was the principal source of domestic supply of mineral fuel in this country, and down to about 1850 it contributed the principal supply to the gas works of Philadelphia and other American cities, for which use it was well adapted. For about twenty years after 1833 the importation of bituminous coal from Great Britain and the British Provinces into Philadelphia, principally for the gas works, steadily increased, owing to the growing scarcity of Virginia coal. About 1856 the gas coals of Western Pennsylvania began to be used in Philadelphia, to the practical exclusion of the foreign supply.

Coal is said to have been discovered in Maryland, six miles northeast of Baltimore, by Benjamin Henfrey, in 1801. The Western Maryland coal basin was soon afterwards opened, and in 1820 the first shipment of coal from Alleghany county, Maryland, seems to have been made, when a few thousand tons were sent down the Potomac in boats. In 1832 the annual shipment of Cumberland coal down the Potomac had increased to about 300,000 bushels, most of which was not sent below Harper's Ferry. The price of Cumberland coal at tide-water at Georgetown in 1838 was 20 cents a bushel. In 1842 the shipment of Cumberland coal to Baltimore, by the Baltimore and Ohio Railroad, commenced, with a total tonnage for the year of 1,708 tons. The total shipments of Cumberland coal by all routes to the seaboard amounted in 1873 to 2,674,101 gross tons, and in 1875 to 2,342,773 tons. The growth of this trade is shown in the following official table of shipments:

Year.	Tons	Year.	Tons.	Year.	Tons.	Year.	Tons.
1842	1,708	1851	257,679	1860	788,909	1869	1,882,669
1843	10,082	1852	334,178	1861	269,674	1870	1,717,075
1844	14,890	1853	533,979	1862	317,634	1871	2,345,153
1845	24,653	1854	659,681	1863	748,345	1872	2,355,471
1846	29,795	1855	662,272	1864	657,996	1873	2,674,101
1847	52,940	1856	706,450	1865	903,495	1874	2,410,895
1848	79,571	1857	582,486	1866	1,079,331	1875	2,342,773
1849	142,449	1858	649,656	1867	1,193,822	1876	1,835,081
1850	196,848	1859	724,354	1868	1,330,443	Total,	30,516,538

In 1804 the first discovery of coal west of the Mississippi was made by the exploring expedition under the leadership of Lewis & Clarke, who traced brown coal or lignite from about twenty miles above the Mandan villages, on the Missouri, nearly to the base of the Rocky mountains, and also upon the Yellowstone and other streams. In one of the exploring expeditions led by Capt. Z. M. Pike, "fine seams of coal" were discovered "far up the Osage river" in 1806. The existence of coal in Alabama was first noticed by Dr. Alexander Jones in 1834. In 1870 coal was mined in twenty States and Territories of the United States.

William J. Buck, in a paper read before the Historical Society of Pennsylvania on the 4th day of January, 1875, quotes from the Penn manuscripts to show that the Penns were fully aware as early as 1769 of the existence of coal at Pittsburgh. Thomas Penn, in a letter of instructions, dated London, January 31, 1769, to his nephew, Lieutenant-Governor John Penn, says: "We desire you will order 5,000 acres of land to be laid out about Pittsburgh, including the town, which may now be laid out, and I think from its situation will become considerable in time; and that the land may be laid out to Colonel Francis and his associates, and other gentlemen of whom I wrote, as contiguous as it may be, and in regular right-angled tracts, if possible." On the following 12th of May he writes to Mr. Tilghman respecting this survey, and says: "I would not engross all the coal-hills, but rather leave the greater part to others who may work them." The difficulties between the mother country and her colonies prevented these instructions from being obeyed.

In 1784, however, the Penns, who retained their proprietary interest in large tracts of Pennsylvania after the close of the Revolution, including the manor of Pittsburgh, surveyed into building lots the town of Pittsburgh, and in the same year the privilege of mining coal in the "great seam" opposite the town was sold at the rate of £30 for each mining lot, extending back to the centre of the hill. This event may be regarded as forming the beginning of the coal trade of Pittsburgh. The Pittsburgh seam of bituminous coal is probably the most extensively accessible seam in this country. H. D. Rogers says of it that it spreads uninterruptedly over the whole valley of the Monongahela, from the base of the Chestnut ridge to the western boundary of the State, and west of the Ohio river.

On the 1st of November, 1785, Samuel Boyd patented a tract of bituminous coal land near Oldtown, in Clearfield county, Pennsylvania, but no coal from this tract was sent eastward of the Alleghenies until 1804. In that year William Boyd shipped the first ark load of Clearfield county coal down the Susquehanna to Columbia, in Lancaster county, a distance of 260 miles. The new fuel, we are told, "was a matter of great surprise" to the good people of that county. Other ark loads followed the first venture, and all the towns along the Susquehanna were soon familiar with bituminous coal. In 1828 the first cargo of Pennsylvania bituminous coal reached Philadelphia from Karthaus, in Clearfield county. The coal was taken down the Susquehanna to Port Deposit, at the head of Chesapeake bay, and thence by vessel to Philadelphia. About the same time coal was sent to Baltimore from the same place. The distance from market was too great, however, and the means of transportation too imperfect to permit the building up of a large trade in bituminous coal between the Alleghenies and the seaboard, and the situation was not materially changed for many years after the completion of the Pennsylvania system of internal improvements in 1834. The competition of domestic anthracite, and of foreign and domestic bituminous coal, the last from Virginia and Maryland, was too great to be easily overcome, and in the case of anthracite it has never yet been overcome, although the shipments of Allegheny and Western Pennsylvania coal and coke to the seaboard are steadily increasing.

Anthracite coal was discovered in Rhode Island and Massachusetts about 1760. It has since then been discovered in Virginia, Arkansas, Oregon, New Mexico, and Pennsylvania, in the United States, and in the State of Sonora in Mexico. It is also claimed that it has been discovered in Kansas. But in none of the States named has the mining of anthracite ever been successfully prosecuted, except in Pennsylvania. In 1840 Virginia produced 200 tons of anthracite, and down to 1873 the total amount mined is estimated not to have exceeded 20,000 tons. In 1860 anthracite coal in the United States was produced only in Pennsylvania and Rhode Island, and in the latter State the yield was only 1,000 net tons. In 1870 Rhode Island produced 14,000 net tons of anthracite, and Pennsylvania all the remainder that was mined in this country. Virtually, the American supply of anthracite coal is produced by Pennsylvania alone. The anthracite deposits in the other sections of the continent, alluded to above, are small in extent, unfavorably situated, or inferior in quality.

S. H. Daddow, in the *American Cyclopædia* (1873), gives the total area of the anthracite coal fields of Pennsylvania as 472 square miles, divided into the Wyoming field, 198 miles; the Middle, 91 miles; the Lehigh, 37 miles; and the Schuylkill, 146 miles. We present a brief description of the development of each of these divisions, which has been carefully collated from the highest authorities.

Anthracite coal was discovered in the Wyoming valley as early as 1766, as appears from a statement by Mr. Buck. He says that James Tilghman, of Philadelphia, addressed a letter to the Proprietaries Thomas and Richard Penn, at Spring Garden, London, on the 14th day of August, 1766, in which he stated that his brother-in-law, Colonel Francis, had gone "up the N. E. Branch as far as Wyoming, where he says there is a considerable body of good land and a very great fund of coal in the hills, which surround a very fine and extensive bottom there. This coal is thought to be very fine. With his compliments he sends you a piece of the coal. This bed of coal, situate as it is on the side of the river, may some time or other be a thing of great value." By way of postscript he adds: "The coal is in a small package of the Governor's." In a reply from Thomas Penn, dated London, the following 7th of November, to Mr. Tilghman, he says in acknowledgment: "I desire you will return my thanks to Colonel Francis for his good services in removing the intruders that were settled on the Indians' land, and for the piece of coal, which we shall have examined by some persons skillful in that article, and send their observations on it." It is further stated by Mr. Buck that the next mention of coal in this section is in a draft by Charles Stewart from a survey made in 1768 of a large tract of land on the west side of the Susquehanna, opposite the present borough of Wilkesbarre, which has "stone coal" marked thereon. The traveler, Dr. Schopf, tells us that in 1783 he found specimens of coal in the Swatara creek, in Lebanon county, and learned of its existence up the west branch of the Susquehanna.

The Wyoming valley was partly settled by a colony of Connecticut people in 1762, representing "The Susquehanna Company." In the same year the Indians murdered about twenty of the colony, and the remainder of the settlers were driven away. Gradually the survivors and others associated with them returned to the valley, and in 1768–9 it is claimed that two of the settlers, being two brothers named Gore, from Connecticut, who were blacksmiths, were the first in this country to use anthracite coal.

In 1776, and throughout the Revolutionary war, anthracite coal was taken in arks from the Wyoming mines above Wilkesbarre down the Susquehanna to the United States armory at Carlisle. Dr. Schopf visited Carlisle in 1783, where he informs us that just outside the town were situated four rows of old and new buildings, in which during the war a number of workmen were engaged in the manufacture of muskets, swords, and wrought-iron cannon of great strength. Mr. Buck says of the first shipment, that "two Durham boats were sent from Harris's Ferry, now Harrisburg, up the Susquehanna to Wyoming for anthracite coal, and about twenty tons were purchased from Mr. Geer and brought down to that place, whence it was hauled to Carlisle in wagons, and which appears was done annually during the Revolutionary war. This coal, we learn, was obtained from a bed belonging to Judge Hollenback, one mile above Wilkesbarre, near the mouth of Mill creek." This trade in arks continued until the completion of the North Branch Canal in July, 1834.

Down to 1808 the anthracite coal of the Wyoming valley was used only by smiths or in forges, but in that year Judge Jesse Fell, of Wilkesbarre, was successful in using it in a grate, as clearly appears from a memorandum signed with his name and dated February 11, 1808. This seems to have been the first successful attempt that had been made to use the new fuel for domestic purposes in a grate, either in this country or in any other country. Anthracite coal was not used in Wales until 1813, nor in France until 1814. Its use in grates soon became general wherever it was mined or could be transported. "In the year 1788," says Judge Fell, "I used it in a nailery, and found it to be profitable in that business. The nails made with it would neat the weight of the rods, and frequently a balance over."

In 1829 the Delaware and Hudson Canal, 123 miles long from Honesdale to the Hudson river, including 15 miles of railroad, was completed at a cost of $7,000,000, expressly to carry to Eastern markets the anthracite coal of the Wyoming valley. In the same year 7,000 tons of coal were sent to New York by this route.

Within the limits of the Schuylkill coal field anthracite coal appears to have been known to the settlers as early as 1770. In Scull's map of Pennsylvania, published in that year, "coal" is marked about the head waters of Schuylkill creek, thence stretching westward to those of the Swatara, and to "the wilderness of St. Anthony." This "wilderness," we may mention, extended from Peters's mountain, in Dauphin county, westward to the Kittatinny or Blue mountains.

The act of March 15, 1784, for the improvement of the navigation of the Schuylkill, mentions "the coal mines at Basler's sawmill" in Schuylkill county. A Yankee hunter, named Nicho Allen, discovered coal in 1790 at the foot of Broad mountain, in the above county. No attempt to mine the coal which Allen had discovered seems to have been made. Reading Howell, in his map of Pennsylvania, published in 1792, marks the existence of "coal" near the source of Panther creek, about five miles east of the present town of Tamaqua, and on the border of Carbon county. In 1795 we read that a blacksmith named Whetstone used anthracite coal in his "smithery," near Pottsville, while others attempted to use it and abandoned it in disgust. About 1800 William Morris took a wagon load of coal from near Port Carbon to Philadelphia, but nobody wanted it, and Mr. Morris made no further efforts to mine or sell coal. About 1806 coal was found at Valley forge, on the Schuylkill river, and a blacksmith named David Berlin and others successfully used it. In 1812 Col. George Shoemaker, of Pottsville, loaded nine wagons with coal from his mines at Centreville, and hauled it to Philadelphia, where with great difficulty he sold two loads at the cost of transportation and gave the other seven loads away. He was by many regarded as an impostor for attempting to sell stone to the public as coal. Of the two loads sold, one was purchased by White & Hazard for use at their wire works at the Falls of Schuylkill, and the other was purchased by Malin & Bishop, for use at the Delaware County rolling mill. By the merest accident of closing the furnace doors, Mr. White obtained a hot fire from the coal, and from this occurrence, happening in 1812, we may date the first successful use of anthracite coal in the manufactures of this country. Up to that time bituminous coal from Virginia had been exclusively used for manufacturing purposes in Philadelphia, and largely for domestic purposes. The war with Great Britain had, however, made Virginia coal very scarce, and it was very desirable that a substitute should be found. The following story is told of the success achieved by White & Hazard in the use of anthracite coal in their wire works: A whole night was spent in endeavoring to make it burn, when the hands in despair quit their work, but left the furnace door shut. Fortunately, one of them forgot his jacket, and on returning to the works half an hour afterwards he noticed that the door was red hot, and the interior of the furnace in a white glowing heat. Thenceforward no trouble was experienced in making the new fuel burn. In 1815 the improvement of the navigation of the Schuylkill river was commenced by the Schuylkill Navigation Company, but many years elapsed before coal was taken to Philadelphia by this channel. In 1822 there were shipped 1,480 tons to Philadelphia, but boats did not pass from Pottsville to Philadelphia until 1825, when 6,500 tons were sent down the Schuylkill. Prior to that year the coal trade of the Lehigh region had been opened.

The first discovery of anthracite coal in the Lehigh region is said to have been made in the Mauch Chunk mountain, about nine miles west of Mauch Chunk, where the village of Summit Hill is now located, by a poor hunter, named Philip Ginter, in 1791. Pieces of the coal discovered by Ginter were taken to Col. Jacob Weiss, at Fort Allen, who opened a "quarry" in the coal mountain that year. The discovery of coal on the Lehigh was announced as follows in the *New York Magazine* for February, 1792, in a communication dated Philadelphia, January 31: "A coal mine has been discovered on the Lehigh, in the county of Northampton. The coal yet found is small, but there is every reason to believe that by searching deeper it will be found larger. The quality is good. If this natural advantage is improved it will be a prodigious resource to the city and cheapen the article of fuel, which now, from the labor of transportation, bears a high price." In 1793 Col. Weiss and others organized the Lehigh Coal-Mine Company, which obtained control of about 6,000 acres of coal land, and several tons of coal were soon "dug up." But there was no market nearer than Philadelphia, and there existed no means of communication with that city. It was not until 1803 that the company succeeded in floating two arks to Philadelphia, through the Lehigh and Delaware rivers, laden with two hundred tons of coal. The coal, however, could not be made to burn, probably because large lumps were used, and was thrown away as useless for any purpose except to "gravel footwalks." It is claimed by Dr. T. C. James, of Philadelphia, in a paper read before the Historical Society of Pennsylvania, on the 19th of April, 1826, that he successfully used anthracite coal in 1804 and thenceforward. In the introduction to the census of the United States for 1860 it is stated that Oliver Evans, of Philadelphia, patented in 1800 a "luminous" grated stove, with talc light, with special reference to the use of mineral coal, "but Dr. Thomas C. James was one of the first to use it habitually in his house, which he continued to do from 1804 to 1826." In the Philadelphia *Sunday Dispatch* mention is made of the first cooking-stove to use anthracite coal, as follows:

> In April, 1828, the *United States Gazette* described an invention which had recently been perfected by Williamson & Paynter, stove manufacturers, southwest

corner of Ninth and Market Streets, Philadelphia. It consisted of "a cast-iron box, fifteen to thirty inches in length, eight to ten inches wide, and six or seven inches deep. It has a grated bottom, and is calculated to burn anthracite coal as readily as charcoal. Upon one edge is placed a common tin-kitchen, or roaster, in front of which, on the opposite edge, is a sheet-iron fixture of the same length, which reflects the heat upon the contents of the tin-kitchen. Through the top of the reflector may be placed boilers for meats and vegetables. By means of false jambs, the size of the fire is reduced at will. By displacing the reflector and the tin-kitchen, the box or furnace may be used to heat water, roast coffee," etc. The contrivance was fixed on four iron wheels, and the cost of it, according to the *Gazette*, would not exceed nine dollars. This was undoubtedly the first improvement of the kind. Such an adaptation could not have been made until after anthracite coal came into common use. It was certainly a great addition to household economy, and was one of the most important improvements in stoves since Franklin invented the "Pennsylvania fireplace."

In 1814 two other ark loads of Lehigh coal reached Philadelphia, and this time the coal was sold at $21 a ton and successfully used by the purchasers, White & Hazard, who were then manufacturing wire at the Falls of Schuylkill. Subsequently these gentlemen became interested in the improvement of the navigation of the Lehigh river, for the purpose of aiding in the development of the Lehigh coal mines, and on the 20th of March, 1818, an act of the Legislature was passed authorizing the incorporation of the Lehigh Coal and Navigation Company. This company obtained a lease for twenty years of the Lehigh Coal-Mine Company's lands, then amounting to 10,000 acres, for one ear of corn a year, if demanded; with the proviso that, from and after three years, the latter company should send, on their own account, at least 40,000 bushels, or about 1,500 tons of coal, per annum to Philadelphia. The new company commenced work immediately. In 1820 it sent 365 tons of anthracite coal to market; in 1821, 1,073 tons; in 1822, 2,440 tons; in 1823, 5,823 tons; and in 1826 its trade increased to 31,280 tons, which seemed to be near the limit of the capacity of the works as then constructed. During the next year, 1827, the Mauch Chunk Railroad was finished, and the ascending navigation was put under contract, after which shipments steadily increased.

To encourage the use of their coal, the Lehigh Coal-Mine Company executed, on the 18th of December, 1807, a lease for twenty-one years to James Butland and James Rowland of two hundred acres of their land in Northampton county, with the privilege of digging iron ore and coal free for the manufacture of iron. The enterprise was unsuccessful, and the lease was abandoned about 1814. We regard it as absolutely certain that no iron was made, and we think no coal was mined. The following extract from the proposition of Butland & Rowland, dated November 30, 1807, is worthy of preservation: "The subscribers, having obtained by patent from the United States an exclusive right of using a natural carbon or peculiar kind of coal, such as is found in the neighborhood of the Lehigh and Susquehanna rivers, and other parts of the United States, for the purpose of manufacturing pig, cast and bar iron, propose commencing the operation in such a situation as may be deemed best adapted to the purpose."

The Middle region, occupying a wild and broken section of country between the Wyoming and Schuylkill regions, and extending on the east to the Lehigh region, was the last of the four great anthracite coal fields of Pennsylvania to be developed. The Mahanoy and Shamokin basins compose its principal divisions. Coal pits or mines are marked in the neighborhood of Mahanoy creek, above Crab run, in Scull's map of Pennsylvania in 1770. But little mining was done in the region until 1834, owing mainly to its inaccessibility. In that year 500 tons were mined and hauled in wagons to neighboring districts.

We copy from Mr. Daddow's paper in the *American Cyclopædia* a table of the canals and railroads which have been constructed for the transportation to market of the anthracite coal of Pennsylvania, and of the capital invested in its mining and transportation.

Railroads Built Exclusively or Mainly for the Transportation of Anthracite.	Length in Miles.		
	Sidings and Branches.	Double Track.	Main Track.
Philadelphia & Reading (main line).	158	151	260
Delaware, Lackawanna & Western	23	85	115
Delaware & Hudson Canal Co.'s R.R.	26	32	45
Lehigh & Susquehanna	3½	75	105
Nesquehoning Valley	2½	....	16½
Trescon	1	....	6
Lehigh Valley (main line)	125	86½	101
Central Railway of New Jersey	?	?	75
Morris & Essex	?	?	83
Pennsylvania & New York	10	15	104
Danville, Hazleton & Wilkesbarre	2½	....	45
East Mahanoy	3	....	7
Little Schuylkill	19	....	28
Mill Creek & Mine Hill	9	3¾	3¾
Mine Hill & Schuylkill Haven	100	29	29
Mount Carbon	2	7	7
Mount Carbon & Port Carbon	9½	2½	2½
Pennsylvania Coal Company's R. R.	10	47	100
Schuylkill & Susquehanna	9	....	54
Schuylkill Valley Navigation R. R.	3	5	11
Shamokin Valley & Pottsville	4½	....	28
McCauley Mountain Railroad	....	....	5½
Totals	520½	538¾	1,231¼

Canals Built Exclusively or Chiefly for the Transportation of Anthracite.	Length in Miles.
Schuylkill Navigation	108
Lehigh Coal & Navigation	48
Delaware Division	60
Wyoming Valley	64
Delaware & Hudson	108
Union	77
Susqueh'na & Tide-water.	45
Pennsylvania	151
Wiconisco	12
Total	673

Capital invested in mining and transporting anthracite.	
Coal lands, 300,000 acres, at $250 per acre	$75,000,000
Collieries, 437, average $100,000 each	43,700,000
Canals, 673 miles, average cost $70,000 per mile	47,000,000
Railroads, 2,290 miles, single track, average $56,000 per mile	128,000,000
Total	$293,700,000

The supply of the towns and cities on the Ohio and Mississippi rivers with Pittsburgh coal became an established business at a very early day after the close of the Revolutionary war. Down to 1850 all the coal shipped westward from Pittsburgh was floated down the Ohio in large flat-bottomed boats with the spring and fall freshets, each boat holding about 15,000 bushels of coal. The boats were usually lashed in pairs, and were sold and broken up when their destination was reached. In 1850 steam tow-boats were introduced, by means of which coal barges were towed down the river, and brought back when empty. This method of transporting coal from Pittsburgh by water has almost entirely superseded the primitive method. One tow-boat now tows or pushes a dozen barges, each barge holding about 12,000 bushels of coal. Some Pittsburgh coal and large quantities of Connellsville coke are also shipped westward by railroad.

Nearly all of the coal now shipped from Pittsburgh is taken from the collieries on the Monongahela river, which is improved by slackwater navigation a distance of 84 miles from Pittsburgh, the Monongahela Slackwater Navigation Company making its first shipments of coal in 1844. Since that year the total shipments of coal and coke by this company have been as follows in bushels, each thousand bushels being regarded as the equivalent of thirty-eight gross tons.

Year.	Bushels.	Year.	Bushels.	Year.	Bushels.	Year.	Bushels.
1844	737,150	1853	15,716,367	1862	18,583,956	1871	48,621,300
1845	4,605,185	1854	17,331,946	1863	26,444,252	1872	57,280,500
1846	7,778,911	1855	22,234,009	1864	35,070,917	1873	58,276,995
1847	9,645,127	1856	8,584,095	1865	39,522,792	1874	65,881,700
1848	9,819,361	1857	28,973,596	1866	42,605,300	1875	61,409,000
1849	9,708,507	1858	25,696,669	1867	30,072,700	1876	62,395,000
1850	12,297,967	1859	28,286,671	1868	45,301,000		
1851	12,521,228	1860	37,947,732	1869	52,512,600	Total,	988,955,496
1852	14,630,841	1861	20,865,722	1870	57,596,400		

The beginning of the manufacture of Connellsville coke, celebrated for its excellence and cheapness as a fuel for blast furnaces and for other manufacturing purposes, and for locomotives, is said by Dr. Frank Cowan to date from the summer of 1841, when William Turner, Sr., P. McCormick, and James Campbell employed John Taylor to erect two ovens for making coke on his farm lying on the Youghiogheny river, a few miles below Connellsville. The ovens were built of the beehive pattern. After repeated failures a fair quality of coke was produced in the early part of the winter of 1841–2. By the spring of 1842 enough coke had been made to load a coal boat ninety feet long. This boat was run down the Youghiogheny, down the Monongahela, and down the Ohio to Cincinnati, where a purchaser was obtained for the coke after some difficulty. This purchaser was Mr. Greenwood, a wealthy foundryman, and the price paid was 6¼ cents a bushel, half cash and half old mill irons. Others embarked in the business of manufacturing coke in 1842, Mordecai Cochran and Richard Brookins among the number, both of whom were successful. In 1844 improved ovens were introduced by Col. A. M. Hill, whose energy and success gave great impetus to the coke business. To-day Connellsville coke is extensively used in many States and Territories, its use extending even to Utah and California. It is free from sulphur. One hundred pounds of Connellsville coal make sixty-two and a half pounds of coke. Good coke is also made largely in Westmoreland county and in other sections in the western part of the State, the quality of which, like that of Connellsville coke, is nowhere surpassed outside of Pennsylvania, not even by that of the celebrated Durham coke of England.

The well-known Blossburg semi-bituminous coal region of Pennsylvania, which annually produces about a million tons of coal, was not brought into public notice until after 1832, in which year it was geologically surveyed by R. C. Taylor. In 1840 its development began by the building of a railroad to reach Northern markets. In that year 4,235 tons were sent to market, followed by 25,966 tons in 1841. The Broad Top semi-bituminous coal section of the State was but very slightly developed until 1856, when the Huntingdon and Broad Top Railroad was completed and the first coal sent eastward to market.

Splint, or block, coal is found in the Shenango valley, and is largely used as it comes from the mine in the manufacture of pig iron. Mercer county produced half a million tons of this coal in 1871. Small deposits of cannel coal are found in the western part of the State. Previous to the discovery of petroleum in large quantities in Northwestern Pennsylvania, illuminating oil was distilled from cannel coal mined along the Allegheny river and elsewhere.

Outside of Pennsylvania the mining of anthracite coal is everywhere conducted on so small a scale that there is nowhere in the world to be found a single coal-breaker except in the northeastern part of this State. Of the sixty-six counties in Pennsylvania, twenty-five contain no coal whatever. There is practically no coal of any kind in the United States east or north of Pennsylvania. As no other country can successfully compete with this State in the production of anthracite, the exportation of the finest domestic fuel in the world should soon become an established and extensive business.

The use of anthracite coal for generating steam was attempted in Philadelphia very early in the present century, but it is stated that this use of anthracite was not successful until 1825, when the proprietors of the rolling-mill at Phœnixville used it under their boilers. It was used successfully about 1827 at the same mill in puddling iron. In 1837–8 successful experiments in smelting iron ore with anthracite coal were made at Mauch Chunk, and in 1839 at Pottsville.

In the latter part of 1823 the Boston Iron Works obtained a full cargo of Lehigh anthracite coal, for use in heating iron for the rolls in their mill, and for smith work. This was the first cargo of anthracite coal taken around Cape Cod. But, a short time previous to this transaction, and in the same year, Cyrus Alger of South Boston obtained a lot of about thirty tons of Lehigh coal, which he used in a cupola for melting iron for castings. In 1839 anthracite coal was used in puddling at the Boston Iron Works by Ralph Crooker, the superintendent.

The position of Pennsylvania among the coal-producing States and Territories of the United States is clearly shown in the statistics of coal production in the census year 1870, herewith presented, and in the accompanying statistics of production in 1874 and 1875, the latter prepared by Richard P. Rothwell. The statistics for the census year are in net tons, but in compiling the statistics for 1874 and 1875 Mr. Rothwell has used the gross ton, and for the purpose of comparison he has presented in a parallel column in gross tons the production of 1870.

THE COAL PRODUCT OF THE UNITED STATES IN THE CENSUS YEAR 1869-70: TONS OF 2,000 POUNDS.

STATES.	No. of Counties.	No. of Collieries.	No. of Engines.	Power of Engines.	No. of Men.	No. of Boys.	Capital Invested.	Wages Paid.	Value of Materials Furnished.	Tons Produced.	Value of Product.	Av'ge value at Colliery.
Pennsylvania—anthracite...	8	229	829	48,809	43,943	9,078	$50,936,785	$22,982,813	$3,596,440	15,650,275	$38,436,745	$2.53
" bituminous..	26	359	69	1,851	16,517	334	16,974,918	8,995,495	604,691	7,798,518	13,921,069	1.77
Total for Pennsylvania...	34	588	898	50,660	60,460	9,412	$67,911,703	$31,978,308	$4,201,131	23,448,793	$52,357,814	....
Illinois..........................	37	322	92	2,645	6,166	135	4,286,575	3,192,977	399,334	2,624,163	6,697,432	$2.33
Ohio..............................	28	307	76	3,363	7,246	321	5,891,813	3,381,108	252,447	2,527,285	5,482,952	2.16
Maryland..........................	2	22	7	431	2,672	55	23,891,600	1,473,325	166,479	1,819,824	2,409,208	1.33
Missouri..........................	18	56	33	2,308	1,878	....	2,587,250	1,277,804	316,082	621,930	2,011,820	3.24
W. Virginia.......................	12	41	10	177	1,043	97	1,434,800	619,376	48,564	608,878	1,035,862	1.70
Indiana...........................	13	46	22	771	1,299	70	554,442	664,592	61,890	437,870	988,621	2.26
Iowa..............................	18	96	5	145	1,341	13	618,332	580,157	73,102	263,487	874,334	3.32
Kentucky..........................	15	30	4	125	676	38	717,950	278,411	27,828	150,582	446,795	2.97
Tennessee.........................	6	11	2	51	399	20	313,784	187,383	15,945	133,418	330,498	2.47
Virginia..........................	4	6	15	1,297	642	....	779,200	168,120	20,312	61,803	226,114	3.66
Kansas............................	5	20	....	....	252	....	106,430	89,191	2,601	32,938	114,278	3.47
Michigan..........................	2	3	3	82	85	8	176,500	58,400	7,550	28,150	104,200	3.70
Rhode Island......................	1	2	2	140	70	5	80,000	33,000	4,160	* 14,000	59,000	4.21
Alabama...........................	2	2	....	....	57	....	26,000	23,970	351	11,000	39,000	3.54
Nebraska..........................	1	3	....	....	6	2	850	2,950	1,450	1,425	8,550	6.00
Wyoming...........................	1	1	1	20	150	15	250,000	225,000	48,000	50,000	800,000	16.00
Washington........................	1	1	2	80	80	....	300,000	70,869	13,394	17,844	107,064	6.00
Utah..............................	2	6	1	15	25	....	44,800	2,550	5,985	5,800	14,950	2.58
Colorado..........................	2	3	....	....	16	....	36,000	9,000	2,410	4,500	16,500	3.66
Total.............................	204	1,566	1,173	62,310	84,563	10,191	$110,008,029	$44,316,491	$5,668,955	32,863,690	$73,524,992	....

RECAPITULATION.

Capital invested in collieries in the United States		$110,008,029
Wages paid in 1869-70		$44,316,491
Supplies furnished at mines in 1869-70		$5,668,955
Production of coal in 1869-70—anthracite	15,664,275	
" " " bituminous	17,199,415	
Total production in 1869-70—net tons		32,863,690

Value of the same at mines		$73,524,992
Number of men employed	84,563	
" boys "	10,191	94,754
Number of steam engines used in mining		1,173
Horse-power of ditto		62,310
Number of collieries worked		1,566
Number of counties in which collieries were worked		204

* Anthracite.

THE TOTAL ANTHRACITE COAL PRODUCTION OF PENNSYLVANIA, IN TONS OF 2,240 POUNDS.

By R. P. Rothwell, Editor of "The Engineering and Mining Journal," New York.

YEARS.	THE WYOMING REGION. Luzerne and Sullivan Counties.		THE LEHIGH REGION. Carbon, Columbia, and Luzerne Counties.		SCHUYLKILL REGION Schuylkill, Northumberland, Columbia, Dauphin, and Lebanon Counties.		ALL THE REGIONS.
	Shipments.	Total Production.	Shipments.	Total Production.	Shipments.	Total Production.	Total Production.
Before 1820	....	10,000	....	3,000	....	5,000	18,000
1820	....	800	365	665	....	500	1,965
1821	....	1,000	1,073	1,473	....	800	3,273
1822	....	1,200	2,240	2,740	....	1,000	4,940
1823	....	1,300	5,823	6,523	....	1,200	9,023
1824	....	1,700	9,541	10,441	....	1,500	13,641
1825	....	2,000	28,393	29,493	5,306	7,006	38,499
1826	....	2,700	31,280	32,780	16,835	19,335	54,815
1827	....	4,000	32,074	34,274	29,493	32,893	71,167
1828	....	6,200	30,233	33,233	47,181	52,481	91,914
1829	7,000	16,800	25,110	29,110	78,293	87,293	133,203
1830	42,000	58,200	41,750	46,850	89,984	104,584	209,634
1831	54,000	78,300	40,966	47,166	81,854	104,854	230,320
1832	84,500	121,700	75,000	82,700	209,271	243,771	448,171
1833	111,777	161,777	123,000	132,100	250,588	298,333	592,210
1834	43,700	53,008	106,244	128,874	226,692	274,977	456,859
1835	90,000	108,900	131,250	158,812	339,508	410,805	678,517
1836	103,861	125,360	148 211	178,891	432,045	531,478	825,729
1837	115,387	139,041	223,902	269,802	523,152	630,398	1,039,241
1838	78,207	94,083	213,615	256,979	433,875	521,951	873,013
1839	122 300	146,760	221,025	265,230	454,538	545,446	957,436
1840	148,470	177,867	225,318	269,932	467,796	560,421	1,008,220
1841	192,270	229,955	143,037	171,072	607,005	725,978	1,127,005
1842	252,599	301,856	272,546	325,692	551,504	659,047	1,286,595
1843	285,605	340,441	267,793	319,209	687,312	819,276	1,478,926
1844	365,911	435,434	377,002	448,633	853,465	1,015,623	1 899,690
1845	451,836	536,329	429,453	509,761	1,093,796	1,298,336	2,344,426
1846	518,389	614,291	517,116	612,783	1,249,154	1,480,247	2,707,321
1847	583,067	689.185	633,507	748,805	1,598,278	1,889,165	3,327,155
1848	685,196	808,531	670,321	790,979	1,672,191	1,973,185	3,572.695
1849	732,910	862,635	781,656	920,009	1,650,101	1,942,168	3,724,812
1850	827,823	972,692	690,456	811.286	1,769,691	2 079,387	3,863.365
1851	1,156,167	1,355,028	964,224	1,130,071	2,308,525	2,705,591	5,190,690
1852	1,284,500	1,502,865	1,072,136	1,254,399	2,536,653	2,967,884	5,725,148
1853	1,475,732	1,723,655	1,054,309	1,231,433	2,555,450	2,984 765	5,939,853
1854	1,603,478	1,868,052	1.207,186	1,406,372	3,066,208	3,572,132	6.846,556
1855	1,771,511	2,060,267	1,284,113	1,493.423	3,551,893	4,130.852	7,684,512
1856	1 972,581	2,288,194	1,351,970	1,568,285	3,571,800	4,143.288	7,999,767
1857	1,952,603	2,261,114	1,318,541	1,526,871	3,373,797	3,906,857	7,694,842
1858	2.186,094	2,527,125	1,380,030	1,595 315	3,236,843	3,741,790	7,864,230
1859	2,731,236	3,151,846	1,628,311	1,879,071	3,448,708	3,979,869	9,010,726
1860	2,941,817	3,388,973	1,821,674	2,098.569	3,749,632	4,319 576	9,807,118
1861	3,055.140	3,513,411	1,738,377	1,999,134	3,160.797	3,634,916	9.147.461
1862	3,145,770	3,608,198	1,351,054	1,549,658	3,432,584	3,937,175	9,095,031
1863	3,759,610	4,304,751	1,894,713	2,169,446	3,911.683	4,478.877	10.953,077
1864	3,960,836	4,526,635	2,054,669	2,348,233	4,161 970	4,756,532	11,631,400
1865	3,255,658	3,720,717	1,822,535	2,082,858	4,356,959	4,979,457	10,783,032
1866	4,736,616	5,413,958	2,128,867	2,433,280	5,464,209	6,245.599	14,092,837
1867	5,328,322	6,089,272	2,062,446	2,356,867	5,161,671	5,899,505	14,345,644
1868	5,990,813	6,846,699	2,507,582	2,865,820	5,335,737	6.097,947	15,810,466
1869	6,058,369	7,279,543	1,929,523	2,313,989	5,653,855	6,782,146	16,375,678
1870	7,554,909	8,814.024	2,990,878	3,489,364	4,728,242	5,516,312	17,819,700
1871	6,713,773	* 7,690,251	2,249,356	2,568,764	6,234,974	7,120,340	17,379,355
1872	9,191,171	*10,750,050	3,610,674	4,202,824	6.126,468	7,131,209	22,084,083
1873	10,047,241	*11,744,141	3,263,168	3,801,447	6,294,454	7,335,333	22,880,921
1874	9,513 042	*10,241,032	3,868,749	4,139,561	6,810,087	7,286,793	21,667,386
1875	10,519,998	*11,062,520	2,731,311	2,867,876	6,393,441	6,713,113	20,643,509
1876†	8,100,000	* 8,530,000	3,800,000	3,970,000	6,200,000	6,500,000	19,000,000
Total,	125,913,795	*143,366,369	59,585,696	68,022,227	130,245,548	149,176,236	360,564,832

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* Includes the Loyalsock region in Sullivan county, opened in 1871. The production of this region has been as follows: 1871, 23,122 tons; 1872, 51,527 tons; 1873, 33,058 tons; 1874, 36,268 tons; 1875, 16,522 tons; 1876 (estimated), 30,000 tons.

† Figures of production for 1876 are merely approximate, the returns not yet being revised.

COAL PRODUCTION OF THE UNITED STATES IN 1870, 1874, AND 1875, IN TONS OF 2,240 POUNDS.

By R. P. Rothwell, Editor of "The Engineering and Mining Journal," New York.

STATES.	Census Report, June 1, 1870.	Year ending Dec. 31, 1874.	Year ending Dec. 31, 1875.	Per-cent'ge of the whole, 1875.
Alabama, bituminous	9,821	45,000	60,000	0.13
Arkansas, do.	....	5,000	9,000	0.02
California, post-carboniferous coal	....	214,600	166,100	0.35
Colorado, do do.	4,018	150,000	150,000	0.32
Illinois, bituminous	2,343,003	3,000,000	3,500,000	7.37
Indiana, do.	390,955	812,000	800,000	1.69
Iowa, do.	235,256	1,500,000	1,500,000	3.16
Kansas, do.	29,410	250,000	275,000	0.58
Kentucky, do.	134,449	360,000	375,000	0.79
Maryland, do.	1,624,843	2,410,895	2,342,773	4.94
Michigan, do.	25,134	12,000	12,000	0.02
Missouri, do.	555,295	714,000	750,000	1.58
Nebraska, do.	1,272	1,300	1,300	....
Nevada, post-carboniferous coal	....	1,000	1,000	....
Ohio, bituminous	2,256,504	3,810,344	4,346,653	9.15
Oregon, post-carboniferous coal	....	43,200	28,800	0.06
Pennsylvania, anthracite* and bituminous†	20,936,422	32,667,386	31,143,509	65.54
Rhode Island, anthracite	12,500	17,000	11,000	0.02
Tennessee, bituminous	119,123	350,000	360,000	0.76
Utah, post-carboniferous coal	5,178	30,000	35,000	0.07
Virginia, do. do.	55,181	73,100	79,200	0.17
Washington, do. do.	15,932	27,100	88,900	0.16
West Virginia, bituminous	543,641	1,000,000	1,100,000	2.32
Wyoming, post-carboniferous coal	44,643	260,000	278,000	0 59
N. Carolina, Georgia & Indian Ter., bitum.	....	60,000	100,000	0.21
Total anthracite	13,985,960	21,684,386	20,654,509	43.48
Total bituminous	15,231,668	25,330,539	26,031,726	54.78
Total post-carboniferous coal	124,952	799,000	827,000	1.74
Total of all kinds	29,342,580	47,813,925	47,513,235	100.00
* Anthracite	13 973,460	21,667,386	20,643,509	43.44
† Bituminous	6,962,962	11,000,000	10,500,000	22.10

It will be seen by reference to the census table that the total production of coal in this country in 1870 was 32,863,690 net tons, of which Pennsylvania produced 23,448,793 tons, or more than two-thirds of the whole. Of the total production, 15,664,275 net tons, or almost one-half, were anthracite, and of this all was produced in Pennsylvania, except 14,000 tons.

By reference to Mr. Rothwell's table it will be observed that, in 1875, with which year the first century of the American Republic may be said to have closed, the total production of coal in the country was 47,513,235 gross tons, of which Pennsylvania produced 31,143,509 tons, or about two-thirds of the whole. Of the total production by Pennsylvania, 20,643,509 gross tons were anthracite, and 10,500,000 tons were bituminous.

Below is an official statement of the number of net tons of bituminous coal and coke forwarded to market over the Pennsylvania railroad in the years 1875 and 1876:

MINES.	1875.			1876.		
	Coal.	Coke.	Total.	Coal.	Coke.	Total.
East Broad Top	53,567	....	53,567	65,999	....	65,999
Huntingdon and Broad Top	137,684	....	137,684	93,881	....	93,881
Cumberland	177,081	....	177,081	147,784	....	147,784
West Maryland Junction	2,870	....	2,870	574	....	574
Snow Shoe	62,426	....	62,426	51,329	....	51,329
Tyrone and Clearfield	915.288	286	915,574	1,190,418	....	1,190,418
Gallitzin & Mountain regi'n	224,143	74	224,217	210,315	....	210,315
West Pennsylvania Railr'd	223,184	52,780	275,964	203,354	57.798	261,152
Southwest do. do.	29,262	549,382	578,644	57,169	539,630	596,799
Westmoreland region	733,671	36,273	769,944	896,810	60,465	957,275
Pittsburgh do.	430,572	120,282	550,854	309,846	162,132	471,978
Totals	2,989,748	759,077	3,748,825	3,227,479	820,025	4,047,504

We present below a table, which we have compiled from reliable sources, showing the production of mineral coal by all countries in late years, to which is added the share of Pennsylvania in the grand aggregate:

MINERAL COAL BY COUNTRIES.	Year.	Gross tons.	Per cent. of total.
Great Britain	1875	131,867,105	47.62
United States	1875	47,513,235	17.16
Germany	1874	46,658,000	16.85
France	1876	17,047,761	6 15
Belgium	1876	15,011,330	5.42
Austria and Hungary	1875	12,852,048	4.64
Russia	1874	1,346,900	.49
Nova Scotia	1876	709,646	.26
New South Wales	1874	1,304,567	.47
Spain	1873	570,000	.21
India	1875	500,000	.18
Turkey in Europe and Asia	......	150,000	.05
Japan	1874	390,000	.14
Chili, China, New Zealand, and other countries	....	1,000,000	.36
Total	....	276,920,592	100.00
United States, Pennsylvania, 31,143,509 tons Other States, 16,369,726 tons	1875	47,513,235	17.43
Percentage of the world's production by Pennsylvania	....	....	11.05

The following statistics by districts of coal mined in Pennsylvania in 1873, a year of greater production than 1875 or 1876, and the year of greatest production since the beginning of coal mining in the State, are taken from Macfarlane's *Coal Regions of America.*

ANTHRACITE—GROSS TONS.

COUNTIES.	Sent to market. Official.	Home consump'n. Estimated.	Total Product.	Grand Total.
Schuylkill	4,252,043	880,000	5,132,043	
Northumberland	1,234,070	170,000	1,404,070	
Columbia	358,741	25,000	383 741	
Dauphin	449,915	30,000	479,915	
Wyoming	10,047,241	1,675,000	11,722,241	
Lehigh	3,243,168	463,000	3,706,168	
Total anthracite	19,585,178	3,243,000	22,828,178	22,828,178

SEMI-BITUMINOUS.—GROSS TONS.

MINES.	Tons produced.	Total.	
Fall Brook Coal Co., Blossburg	312,466	991,057	
Morris Run Coal Co., Blossburg	357,384		
Blossburg Coal Co., Blossburg	321,207		
McIntyre Coal Co., Ralston	212,462	212,462	
Towanda Coal Co., Towanda	252,329	337,644	
Fall Creek Coal Co., Towanda	85,315		
Total Northern Pennsylvania	1,541,163		
Snow Shoe, Centre county	95,257	1,057,539	
Clearfield county	612,036		
Broad Top, Huntingdon county	350,246		
Total semi-bituminous	2,598,702	2,598,702	2,598,702

BITUMINOUS.—GROSS TONS.

LOCALITIES.	Tons produced.	
Johnstown, used in ironworks, etc. (estimated)	250,000	
Allegheny Mountain region, Pennsylvania Railroad	220,409	
West Pennsylvania Railroad	259,340	
Southwest Pennsylvania Railroad	255,355	
Westmoreland gas coal	878,944	
Pittsburgh gas coal	685,611	
Philadelphia and Erie Railroad	81,742	
Allegheny Valley Railroad	436,650	
Erie and Pittsburgh Railroad (block coal)	529,496	
Lawrence Railroad	132,118	
Newcastle and Beaver Railroad	315,044	
Jamestown and Franklin Railroad	111,169	
Little Sawmill Run Railroad	159,057	
Pittsburgh and Castle Shannon Railroad	125,109	
Pittsburgh and Connellsville Railroad	846,374	
Pittsburgh, West Virginia and Charleston Railroad	2,000	
Pittsburgh, Cincinnati and St. Louis Railroad	447,855	
Shenango and Allegheny Railroad	99,091	
Wheeling, Pittsburgh and Baltimore Railroad	3,733	
Monongahela Navigation	2,157,583	
Used by railroads, not in above	600,000	
Mined on rivers and in country pits, not in above	500,000	
Total bituminous coal	9,096,680	9,096,680
Total production of Pennsylvania in 1873	....	34,523,560

PENNSYLVANIA AGRICULTURE.

In climate, soil, water, timber, alternation of hill and dale, and other physical characteristics, Pennsylvania is admirably adapted to the production of the leading cereals, the grasses, roots and fruits, and the raising of domestic animals. Its first farmers were Swedes, on the banks of the Delaware, who were enraptured with the fertile soil and quick harvests of "New Sweden." William Penn and his English colonists were also charmed with the pleasing agricultural prospect which was presented to their eyes in the surroundings of "the greene country towne" of Philadelphia. But it is to the German and Scotch-Irish settlers of Pennsylvania that the credit of developing the agricultural resources of the State is mainly due. Their descendants possess almost all its farms to-day.

The position of Pennsylvania as an agricultural State is shown in the census reports and in the reports of the Department of Agriculture—both national authorities. The State itself has done but little to make its great agricultural wealth known to the world, or even to its own people. With the statistics of the census of 1870 and previous years and recent reports of the Department of Agriculture before us, we are enabled to present a clear and comprehensive statement of the progress made by Pennsylvania in developing its agricultural resources down to the present time. As preliminary to this statement, it may be profitable to glance a moment at the size and population of Pennsylvania as compared with the other States and Territories of the Union.

According to the census of 1870 and later authorities, the total area of the United States is 3,603,884 square miles, and the area of Pennsylvania is 46,000 square miles. Of the whole number of States, no fewer than twenty contain larger areas than Pennsylvania, while all of the Territories also exceed it in size. By the census of 1870 the total population of the United States in that year was 38,923,210. Pennsylvania, with 3,521,890 inhabitants, was second in population; New York, with 4,387,464 inhabitants, being first. In density of population, Pennsylvania ranked sixth in the Union; Massachusetts, Rhode Island, Connecticut, New Jersey, and New York outranking it in the order named. The following table, which is compiled from the *American Cyclopædia*, will show the position of Pennsylvania in extent of territory and in population as compared with the other States and Territories.

STATES.	Area in square miles.	Relative size.	Aggregate population, including all Indians.	Rank in total population, including all Indians.	Population per square mile, excluding tribal Indians.	Rank in density of population, excluding tribal Indians.
Alabama	50,722	17	996,992	16	19.66	23
Arkansas	52,198	16	484,471	26	9.30	29
California	188,981	2	582,031	24	2.96	34
Colorado	104,500	3	47,164	38	0.38	38
Connecticut	4,750	36	537,454	25	113.15	3
Delaware	2,120	37	125,015	35	58.97	9
Florida	59,268	10	188,248	33	3.17	32
Georgia	58,000	11	1,184,109	12	20.42	22
Illinois	55,410	13	2,539,891	4	45.84	11
Indiana	33,809	29	1,680,637	6	49.71	10
Iowa	55,045	14	1,192,092	11	21.69	18
Kansas	81,318	7	373,299	29	4.48	31
Kentucky	37,680	26	1,321,011	8	35.33	12
Louisiana	41,346	23	726,915	21	17.58	27
Maine	35,000	27	626,915	23	17.91	26
Maryland	11,124	31	780,894	20	70.20	7
Massachusetts	7,800	35	1,457,351	7	186.84	1
Michigan	56,451	12	1,187,234	13	20.97	20
Minnesota	83,531	6	446,056	27	5.26	30
Mississippi	47,156	19	827,922	18	17.56	28
Missouri	65,350	9	1,721,295	5	26.34	17
Nebraska	75,995	8	129,322	34	1.62	35
Nevada	104,125	4	58,711	37	0.41	37
New Hampshire	9,280	33	318,300	31	34.30	13
New Jersey	8,320	34	906,096	17	108.91	4
New York	47,000	20	4,387,464	1	93.25	5
North Carolina	50,704	18	1,071,361	14	21.13	19
Ohio	39,964	24	2,665,260	3	66.69	8
Oregon	95,274	5	101,883	36	0.95	36
Pennsylvania	46,000	21	3,521,890	2	76.56	6
Rhode Island	1,306	38	217,353	32	166.43	2
South Carolina	34,000	28	705,606	22	20.75	21
Tennessee	45,600	22	1,258,520	9	27.60	16
Texas	274,356	1	818,899	19	2.98	33
Vermont	10,212	32	330,551	30	32.37	14
Virginia	38,348	25	1,225,163	10	31.95	15
West Virginia	23,000	30	442,014	28	19.22	25
Wisconsin	53,924	15	1,064,985	15	19.56	24
Total States	2,088,967	....	38,250,374	....	18.26	....
TERRITORIES.						
Arizona	113,916	4	41,710	5	0.08	9
Dakota	148,932	1	40,501	6	0.09	7
District of Columbia	64	10	131,700	1	2,057.81	1
Idaho	86,294	6	20,583	9	0.17	5
Indian Territory	68,991	9	68,152	4	....	....
Montana	145,776	2	39,895	7	0.14	6
New Mexico	121,201	3	111,303	2	0.76	3
Utah	84,476	7	99,581	3	1.03	2
Washington	69,994	8	37,432	8	0.34	4
Wyoming	97,883	5	11,518	10	0.09	8
Total Territories	937,527	....	602,375	....	0.43	....
Total U. S. exclusive of Alaska	3,026,494	....	38,852,749	....	12.74	....
Alaska	577,390	....	70,461	....	....	....
Total United States	3,603,884	....	38,923,210	....	10.70	....

From the following table will be learned the whole number of acres of land in farms in each of the United States in 1870, the number of acres of improved land in farms, the number of acres of unimproved land in farms, the percentage of unimproved land in farms to the total land in farms, the average size of farms, the average value of farms per acre, and the average value of farm implements per acre. This table, which is compiled from the census statistics of 1870, shows that Pennsylvania had in that year fewer acres of land in farms than New York, Ohio, Indiana, Illinois, Kentucky, Tennessee, Missouri, Virginia, Georgia, North Carolina, or Texas; that the percentage of unimproved land in farms to the total acreage of land in farms was greater in Pennsylvania than in New Hampshire, Vermont, Connecticut, New York, New Jersey, Delaware, Maryland, District of Columbia, Ohio, Illinois and Utah; that the average size of farms in Pennsylvania in 1870 was smaller than in any of the States and Territories except Maine, Connecticut, District of Columbia, Michigan, New Jersey, Utah, and Wyoming, and was the same as in Massachusetts and New York; that the average value of farms in Pennsylvania was greater than in any of the other States except New Jersey, or in any of the Territories; and that the average value of farm implements in Pennsylvania was excelled by only New York and New Jersey.

STATES AND TERRITORIES, 1870.	Land in farms—Acres.			Percentage of unimproved land in farms to total land in farms.	Average size of farms in acres.	Value of farms per acre.	Value of farm implements to each acre.
	Total.	Improved	Unimp'vd.				
Alabama	14,961,178	5,062,204	9,898,974	66.2	222	$4.66	$0.22
Arizona	21,807	14,585	7,222	33.1	127	7.39	.92
Arkansas	7,597,296	1,859,821	5,737,475	75.5	154	5.28	.29
California	11,427,105	6,218,133	5,208,972	45.6	482	12.36	.46
Colorado	320,346	95,594	224,752	70.2	184	10.56	.85
Connecticut	2,364,416	1,646,752	717,664	30.4	93	52.54	1.37
Dakota	302,376	42,645	259,731	85.9	176	6.89	.47
Delaware	1,052,322	698,115	354,207	33.7	138	44.39	1.14
District of Columbia	11,677	8,266	3,411	29.2	56	....	....
Florida	2,373,541	736,172	1,637,369	69.0	232	4.19	.21
Georgia	23,647,941	6,831,856	16,816,085	71.1	338	3.99	.19
Idaho	77,139	26,603	50,536	65.5	186	6.38	.76
Illinois	25,882,861	19,329,952	6,552,909	25.3	128	35.56	1.33
Indiana	18,119,648	10,104,279	8,015,369	44.2	112	35.03	.97
Iowa	15,541,793	9,396,467	6,145,326	39.5	134	25.26	1.31
Kansas	5,656,879	1,971,003	3,685,876	65.2	148	15.96	.71
Kentucky	18,660,106	8,103,850	10,556,256	56.6	158	16.67	.45
Louisiana	7,025,817	2,045,640	4,980,177	70.9	247	9.75	1.02
Maine	5,838,058	2,917,793	2,920,265	50.0	98	18.93	.88
Maryland	4,512,579	2,914,007	1,598,572	35.4	167	37.75	1.16
Massachusetts	2,730,283	1,736,221	994,062	36.4	103	42.64	1.83
Michigan	10,019,142	5,096,939	4,922,203	49.1	101	39.74	1.36
Minnesota	6,483,828	2,322,102	4,161,726	64.2	139	15.17	1.04
Mississippi	13,121,113	4,209,146	8,911,967	67.9	193	6.22	.33
Missouri	21,707,220	9,130,615	12,576,605	57.9	146	18.10	.71
Montana	139,537	84,674	54,863	39.3	164	5.22	1.04

States and Territories, 1870.	Land in farms—Acres.			Percentage of unimproved land in farms to total land in farms	Average size of farms in acres.	Value of farms per acre.	Value of farm implements to each acre.
	Total.	Improved.	Unimp'vd.				
Nebraska	2,073,781	647,031	1,426,750	68.8	169	14.58	.74
Nevada	208,510	92,644	115,866	55.5	201	7.12	.78
New Hampshire	3,605,994	2,334,487	1,271,507	35.3	122	22.34	.95
New Jersey	2,989,511	1,976,474	1,013,037	33.9	98	86.14	2.63
New Mexico	833,549	143,007	690,542	82.8	186	2.71	.14
New York	22,190,810	15,627,206	6,563,604	29.6	103	57.35	2.07
North Carolina	19,835,410	5,258,742	14,576,668	73.5	212	3.94	.20
Ohio	21,712,420	14,469,133	7,243,287	33.4	111	48.56	1.18
Oregon	2,389,252	1,116,290	1,272,962	53.3	315	9.35	.54
Pennsylvania	17,994,200	11,515,965	6,478,235	36.0	103	57.98	1.98
Rhode Island	502,308	289,030	213,278	42.5	94	42.95	1.56
South Carolina	12,105,280	3,010,539	9,094,741	75.1	233	3.70	.18
Tennessee	19,581,214	6,843,278	12,737,936	65.1	166	11.17	.41
Texas	18,396,523	2,964,836	15,431,687	83.9	301	3.26	.18
Utah	148,361	118,755	29,606	20.0	30	15.48	1.96
Vermont	4,528,804	3,073,257	1,455,547	32.1	134	30.77	1.15
Virginia	18,145,911	8,165,040	9,980,871	55.0	246	11.77	.27
Washington	649,139	192,016	457,123	70.4	208	6.12	.43
West Virginia	8,528,394	2,580,254	5,948,140	69.7	214	11.91	.24
Wisconsin	11,715,321	5,899,343	5,815,978	50.5	114	25.64	1.21
Wyoming	4,341	338	4,003	92.2	25	4.18	1.31
The United States	407,735,041	188,921,099	218,813,942	53.7	153	....	....

The foregoing tables show that in 1870 Pennsylvania was not entitled to the highest rank among the agricultural States of the Union, except in the average value of its farms and the average value per acre of its farm implements; yet these two exceptions indicate superior farm buildings, fences, etc.; the adoption of progressive methods of cultivation; and proximity to good markets, which the extensive manufactures and the extensive mining operations of the State have mainly aided in creating.

Passing from the census statistics, we take up those furnished by the Department of Agriculture in its report for 1876. These statistics are careful estimates of acreage, production, and prices of crops, supplied by capable correspondents in almost every county in the Union, these correspondents being almost invariably farmers. From personal knowledge of the whole system of collecting these statistics, we are warranted in claiming for them the closest approximation to absolute accuracy that is possible in the absence of an official census. Indeed, in the annual statistical exhibit of the Department the census statistics, so far as they may be applicable, form a basis of ascertained facts upon which the estimates of practical men are founded. They are the known quantity from which the increase or decrease of acreage, production of the several crops, etc., are calculated. With this explanation we give the following full statistics of the agricultural operations of the Centennial year, which we shall afterwards compare with the census statistics for preceding years.

No. 1.—Summary for each State, showing the product, the area, and the value of each crop for 1876.

STATES.	INDIAN CORN.			WHEAT.			RYE.		
	BUSHELS.	ACRES.	VALUE.	BUSHELS.	ACRES.	VALUE.	BUSHELS.	ACRES.	VALUE.
Maine	1,400,000	45,161	$1,106,000	296,000	24,666	$467,680	33,600	2,400	$37,296
New Hampshire	2,029,000	48,309	1,602,910	192,000	12,800	297,600	47,000	2,611	47,000
Vermont	1,892,000	48,512	1,475,760	421,000	28,639	602,030	80,000	4,324	76,800
Massachusetts	1,150,000	32,857	862,500	17,500	972	22,750	290,500	21,518	261,450
Rhode Island	290,000	8,285	217,500	......	......	......	18,500	1,541	16,650
Connecticut	1,850,000	56,923	1,369,000	35,000	2,413	45,500	360,000	30,000	309,600
New York	21,000,000	700,000	14,280,000	9,750,000	650,000	12,772,500	2,760,000	230,000	2,263,200
New Jersey	9,400,000	261,111	5,264,000	2,176,000	160,000	2,872,320	520,000	38,518	421,200
Pennsylvania	42,250,000	1,207,142	23,237,500	18,740,000	1,419,696	23,425,000	3,240,000	231,428	2,397,600
Delaware	3,850,000	128,333	1,925,000	920,000	57,500	1,168,400	12,000	923	9,600
Maryland	13,780,000	475,172	6,752,200	6,000,000	480,000	7,620,000	315,000	23.333	239,400
Virginia	20,600,000	1,030,000	9,476,000	7,875,000	926,470	8,898,750	475,000	49,479	304,000
North Carolina	23,000,000	1,575 342	12,420,000	3,000,000	410,958	3,600,000	360,000	42,857	316,800
South Carolina	9,700,000	1,182,926	7,566,000	850,000	106,250	1,411 000	44,000	6,666	64,680
Georgia	23,620,000	2,147,272	14,172,000	2,840,000	473,333	3,805,600	......	......	......
Florida	2,500,000	250,000	2,150,000	......	......	......	......	......	......
Alabama	26,215,000	2,016,538	12,583,200	1,140,000	175,384	1,402,200	......	......	......
Mississippi	20,000,000	1,333,333	11,000,000	325,000	42,207	448,500	......	......	......
Louisiana	12,000,000	697,674	8,400.000	......	......	......	......	......	......
Texas	48,000,000	1,920,000	24,000.000	4,750,000	365,384	5,130,000	56,000	3,200	53,200
Arkansas	21,500,000	895,833	8,385,000	1,400,000	170,731	1,330,000	50,000	4,545	39,500
Tennessee	54,500,000	2,224,489	17,440,000	11,260,000	1,356,626	10,471,800	355,000	39,444	326,600
West Virginia	10,605,000	376,063	4,772,250	3,377,000	307,000	3,748,470	300,000	23,809	222.000
Kentucky	63,300,000	1,889,552	18.990,000	8,237,000	823,700	8,237,000	1,150,000	103,603	805,000
Ohio	115,000,000	3,133,514	43,700,000	21,750,000	1,843,220	24,795,000	460,000	35,937	312,800
Michigan	21,350,000	736,206	11,102,000	15,170,000	1,264,166	17,597,200	252,000	18,666	168,840
Indiana	99,000,000	3,300,000	33,660,000	20,000,000	1,818,181	20,400,000	520,000	42,622	369,200
Illinois	223,000,000	8,920,000	69,130,000	23,440,000	2,520,430	21,799,200	2.580,000	161,250	1,496,400
Wisconsin	27,000,000	794,117	11,070,000	16,800,000	1,866,666	16,968,000	1,330,000	95,000	837,900
Minnesota	7,400,000	291,338	2,960,000	16,000,000	1,882,352	14,400,000	111,000	6,937	67,710
Iowa	142,500,000	4,750,000	35,625,000	17,600,000	2,885,245	15,840,000	350,000	25,000	185,500
Missouri	102,500,000	3,687,050	28,700,000	15,240,000	1,229,032	13,563,600	680,000	45,945	387,600
Kansas	82,836,000	1,904,275	19,880,640	16,510,000	1,130,821	14,198,600	3,450,000	165,865	1,483,500
Nebraska	25,500,000	850,000	6,885,000	4,330,000	376,521	1,169,100	92,000	5,575	36,800
California	1,600,000	48,484	1,712,000	30,000,000	2,307,692	34,200,000	78,000	5,131	74,100
Oregon	120,000	4,000	108,000	4,675,000	275,000	3,272,500	5,200	247	3,900
Nevada	15,500	553	15,500	390,000	21,428	429,000	......	......	......
The Territories	1,575,000	63,000	1,496,250	3,850,000	211,538	3,850,000	......	......	......
Total	1,283,827,500	49,033,364	$475,491,210	289,356,500	27,627,021	$300,259,300	20,374,800	1,468,374	$13,635,826

No. 2.—Summary for each State, showing the product, the area, and the value of each crop for 1876—Continued.

STATES.	OATS			BARLEY.			BUCKWHEAT.		
	BUSHELS.	ACRES.	VALUE.	BUSHELS.	ACRES.	VALUE.	BUSHELS.	ACRES.	VALUE.
Maine	2,352,000	102,260	$1,152,480	663,000	35,837	$497,250	397,000	17,644	$246,140
New Hampshire	1,222,000	37,030	598,780	108,000	4,354	92,880	97,000	5,105	63,050
Vermont	4,514,000	122,000	1,895,880	121,000	5,377	106,480	399,000	19,368	255,360
Massachusetts	490,000	16,333	249,900	55,000	2,200	49,500	54,000	4,153	35,100
Rhode Island	90,000	3,333	54,000	9,000	473	8,100			
Connecticut	1,050,000	43,750	504,000	27,500	1,100	25,300	130,000	8,666	104,000
New York	40,025,000	1,404,385	16,810,500	6,600,000	300,000	5,478,000	3,750,000	267,857	2,775,000
New Jersey	4,150,000	156,603	1,743,000				330,000	28,695	273,900
Pennsylvania	33,150,000	1,159,090	11,602,500	560,000	25,454	476,000	2,100,000	154,411	1,554,000
Delaware	375,000	14,423	127,500						
Maryland	4,450,000	206,976	1,513,000				75,000	3,846	45,750
Virginia	7,650,000	484,177	3,060,000				48,000	3,582	27,840
North Carolina	3,530,000	261,481	1,906,200						
South Carolina	1,100,000	75,862	902,000						
Georgia	5,700,000	491,379	3,876,000						
Florida	132,000	9,777	130,680						
Alabama	1,800,000	127,659	1,206,000						
Mississippi	780,000	47,852	538,200						
Louisiana									
Texas	3,650,000	117,741	2,117,000	80,000	2,758	65,600			
Arkansas	925,000	45,121	462,500						
Tennessee	5,400,000	306,818	2,106,000	80,000	4,324	72,000	97,000	5,914	80,510
West Virginia	2,800,000	124,444	980,000	52,000	3,333	44,200	83,000	4,715	53,950
Kentucky	6,850,000	311,363	2,466,000	275,000	12,790	231,000			
Ohio	24,500,000	924,528	7,595,000	800,000	40,000	624,000	390,000	31,967	292,500
Michigan	11,500,000	366,242	5,175,000	955,000	47,750	735,350	620,000	43,971	427,800
Indiana	13,270,000	584,581	4,113,700	400,000	26,315	316,000	160,000	9,302	121,600
Illinois	48,000,000	2,400,000	12,480,000	2,200,000	124,293	1,100,000	175,000	11,824	141,750
Wisconsin	21,700,000	700,000	6,510,000	1,800,000	81,818	1,170,000	425,000	23,611	259,250
Minnesota	12,000,000	480,000	4,440,000	1,520,000	69,406	957,600	47,800	3,296	31,548
Iowa	21,250,000	836,614	4,887,500	5,800,000	241,666	2,610,000	140,000	9,459	109,200
Missouri	13,150,000	650,990	3,419,000	435,000	25,588	282,750	55,000	3,055	36,850
Kansas	12,389,000	390,820	2,725,580	1,960,000	69,406	882,000	96,000	6,000	86,400
Nebraska	3,500,000	138,339	805,000	470,000	21,363	150,400			
California	2,450,000	70,000	1,813,000	11,800,000	536,363	8,142,000			
Oregon	2,750,000	72,368	1,375,000	540,000	18,620	367,200			
Nevada	90,000	2,903	63,000	550,000	21,568	495,000			
The Territories	2,150,000	71,666	1,462,000	850,000	30,357	756,500			
Total	320,884,000	13,358,908	$112,865,900	38,710,500	1,766,511	$25,735,110	9,668,800	666,441	$7,021,498

No. 3.—Summary for each State, showing the product, the area, and the value of each crop for 1876—Continued.

STATES.	POTATOES.			TOBACCO.			HAY.		
	BUSHELS.	ACRES.	VALUE.	POUNDS.	ACRES.	VALUE.	TONS.	ACRES.	VALUE.
Maine	5,868,000	58,680	$3,696,840				1,264,800	1,290,612	$14,165,760
New Hampshire	3,990,000	39,900	2,394,000	414,000	276	$49,680	702,000	780,000	8,620,560
Vermont	5,265,000	37,607	2,632,500				1,060,500	1,060,500	10,933,755
Massachusetts	3,250,000	32,500	2,697,500	4,650,000	2,835	437,100	675,000	661,764	10,800,000
Rhode Island	500,000	7,692	500,000				115,000	143,750	2,300,000
Connecticut	1,700,000	26,153	1,649.000	7,568,000	6,203	688,688	575,000	558,252	10,062,500
New York	23,000,000	418,181	18,400,000	1,500,000	2,142	126,000	5,600,000	4,869,565	62,720,000
New Jersey	2,100,000	52,500	2,520,000				590,000	491,666	9,381,000
Pennsylvania	6,800,000	136,000	5,780,000	13,200,000	9,565	1,188,000	2,900,000	2,357,723	35,264,000
Delaware	325,000	4,642	308,750				37,500	31,779	562,500
Maryland	1,150,000	17,968	839,500	21,500,000	31,159	1,720,000	237,000	197,500	3,436,500
Virginia	1,350,000	21,093	837,000	49,300,000	82,166	3,944,000	256,000	204,800	3,537,920
North Carolina	850,000	12,142	544,000	16,225,000	29,500	1,460,250	116,200	92,960	1,292,144
South Carolina	104 000	1,300	96,720				24,000	20,000	396,000
Georgia							23,600	18,153	347,628
Florida				225,000	321	45,060			
Alabama	260,000	4,642	249,600				24,000	18,461	402,000
Mississippi	320,000	4,000	307,200				23,500	17,407	383,285
Louisiana	40,000	555	34,000						
Texas	544,000	5,726	364,480	175,000	234	38,500	80,000	57.971	900,800
Arkansas	450,000	5,844	261,000	1,980,000	2,200	237,600	23,600	16,428	301,300
Tennessee	1,260,000	15,750	604,800	32,200,000	51,111	2,576,000	165,000	121,323	2 237,400
West Virginia	1,125,000	17,045	585,000	2,750,000	4,296	220,000	265,000	203,846	2,650,000
Kentucky	2,100,000	25,609	1,029,000	128,000,000	188,235	8,960,000	363,000	290,400	3,720,750
Ohio	9,000,000	128,571	5,580,000	26,500,000	32,716	1,722,500	1,950,000	1,625,000	16,419,000
Michigan	4,750,000	86,363	3,420,000				1,375,000	1,057,692	13,750,000
Indiana	4,300,000	66,153	2,408,000	16,500,000	22,000	940,500	1,150,000	920,000	9,855,500
Illinois	9,450 000	126,000	5,764,500	11,000,000	14,473	627,000	3,500,000	2,500,000	23,380,000
Wisconsin	5,820,000	72,750	2,851,800	3,300,000	4,125	198,000	1,533,000	1,095,000	11,880,750
Minnesota	3,100,000	32,291	1,116,000				1,060,000	757,142	5,300,000
Iowa	7,000,000	87,500	5,600,000				1,950,000	1,373,239	9,750,000
Missouri	5,400,000	71,052	2,268,000	43,245,000	55,800	3,027,150	750,000	555,555	6,390,000
Kansas	5,286,000	50,342	2,643,000	770,000	1,100	77,000	864,000	720,000	4,233,600
Nebraska	1,400,000	18,181	448,000				380,000	271,428	1,280,600
California	4,000,000	32,000	3,320,000				850,000	629,629	9,868,500
Oregon	1,000,000	7,142	640,000				130,000	89,655	1,255,000
Nevada	220,000	2,200	211,200				55,000	40,740	742,500
The Territories	1,750,000	15,909	1,260,000				200,000	142,857	2,400.000
Total	124,827,000	1.741.983	$83,861.390	381,002,000	540 457	$28,282,968	30,867,100	25,282,797	$300,901,252

No. 4.—Table showing the average yield per acre, and the price per bushel, pound, or ton, of farm-products for the year 1876.

STATES.	CORN.		WHEAT.		RYE.		OATS.		BARLEY.		BUCKWHEAT.		POTATOES.		TOBACCO.		HAY.	
	Bushels.	Price per Bushel.	Bushels.	Price per Bushel.	Bushels.	Price per Bushel.	Bushels.	Price per Bushel.	Bushels.	Price per Bushel.	Bushels.	Price per Bushel.	Bushels.	Price per Bushel.	Pounds.	Price per Pound.	Tons.	Price per Ton.
Maine	31	$0 79	12	$1 58	14	$1 11	23	$0 49	18.5	$0 75	22.5	$0 62	100	$0 63	....	....	0.98	$11 20
New Hampshire	42	79	15	1 55	18	1 00	33	49	24.8	86	19	65	100	60	1,500	$0 12	0.90	12 28
Vermont	39	78	14.7	1 43	18.5	96	37	42	22.5	88	20.6	64	140	50	....	....	1.00	10 31
Massachusetts	35	75	18	1 30	13.5	90	30	51	25	90	13	65	100	83	1,640	9.4	1.02	16 00
Rhode Island	35	75	....	....	12	90	27	60	19	90	....	....	65	1 00	....	....	0.80	20 00
Connecticut	32.5	74	14.5	1 30	12	86	24	48	25	92	15	80	65	97	1,220	9.1	1.03	17 50
New York	30	68	15	1 31	12	82	28.5	42	22	83	14	74	55	80	700	8.4	1.15	11 20
New Jersey	36	56	13.6	1 32	13.5	81	26.5	42	....	....	11.5	83	40	1 20	....	....	1.20	15 90
Pennsylvania	35	55	13.2	1 25	14	74	28.6	35	22	85	13.6	74	50	85	1,380	9	1.23	12 16
Delaware	30	50	16	1 27	13	80	26	34	....	....	....	....	70	95	....	....	1.18	15 00
Maryland	29	49	12.5	1 27	13.5	76	21.5	34	....	....	19.5	61	64	73	690	8	1.20	14 50
Virginia	20	46	8.5	1 13	9.6	64	15.8	40	....	....	13.4	58	.64	62	600	8	1.25	13 82
North Carolina	14.6	54	7.3	1 20	8.4	88	13.5	54	....	....	....	....	70	64	550	9	1.25	11 12
South Carolina	8.2	78	8	1 66	6.6	1 47	14.5	82	....	....	....	....	80	93	....	....	1.20	16 50
Georgia	11	60	6	1 34	....	....	11.6	68	....	....	....	....	....	....	....	....	1.30	14 73
Florida	10	86	....	....	....	....	13.5	99	....	....	....	....	....	....	700	20	....	....
Alabama	13	48	6.5	1 23	....	....	14.1	67	....	....	....	....	56	96	....	....	1.30	16 75
Mississippi	15	55	7.7	1 38	....	....	16.3	69	....	....	....	....	80	96	....	....	1.35	16 31
Louisiana	17.2	70	....	....	....	....	....	....	....	....	....	....	72	85	....	....	....	....
Texas	25	50	13	1 08	17.5	95	31	58	29	82	....	....	95	67	745	22	1.38	11 26
Arkansas	24	39	8.2	95	11	79	20.5	50	....	....	....	....	77	58	900	12	1.40	13 10
Tennessee	24.5	32	8.3	92	9	92	17.6	39	18.5	90	16.4	83	80	48	630	8	1.36	13 56
West Virginia	28.2	45	11	1 11	12.6	74	22.5	35	15.6	85	17.6	65	66	52	640	8	1.30	10 00
Kentucky	33.5	30	10	1 00	11.1	70	22	36	21.5	84	....	....	82	49	680	7	1.25	10 25
Ohio	36.7	38	11.8	1 14	12.8	68	26.5	31	20	78	12.2	75	70	62	810	6.5	1.20	8 42
Michigan	29	52	12	1 16	13.5	67	31.4	45	20	77	14.1	69	55	72	....	....	1.30	10 00
Indiana	30	34	11	1 02	12.2	71	22.7	31	15.2	79	17.2	76	65	56	750	5.7	1.25	8 57
Illinois	25	31	9.3	93	16	58	20	26	17.7	50	14.8	81	75	61	760	5.7	1.40	6 68
Wisconsin	34	41	9	1·01	14	63	31	30	22	65	18	61	80	49	800	6	1.40	7 75
Minnesota	25.4	40	8.5	90	16	61	25	37	21.9	63	14.5	66	96	36	....	....	1.40	5 00
Iowa	30	25	6.1	90	14	53	25.4	23	24	45	14.8	78	80	80	....	....	1.42	5 00
Missouri	27.8	28	12.4	89	14.8	57	20.2	26	17	65	18	67	76	42	775	7	1.35	8 52
Kansas	43.5	24	14.6	86	20.8	43	31.7	22	23.5	45	16	90	105	50	700	10	1.20	4 90
Nebraska	30	27	11.5	73	16.5	40	25.3	23	22	32	....	....	77	32	....	....	1.40	3 37
California	33	1 07	13	1 14	15.2	95	35	74	22	69	....	....	125	83	....	....	1.35	11 61
Oregon	30	90	17	70	21	75	38	50	29	68	....	....	140	64	....	....	1.45	9 50
Nevada	28	1 00	18.2	1 10	....	....	31	70	25.5	90	....	....	100	96	....	....	1.35	13 50
The Territories	25	95	18.2	1 00	....	....	30	68	28	89	....	....	110	72	....	....	1.40	12 00

No. 5.—Table showing the average cash value per acre of the principal crops of the farm for the year 1876.

STATES.	Average value per acre.	STATES.	Average value per acre.
Maine	$13 54	Texas	$13 21
New Hampshire	14 79	Arkansas	9 65
Vermont	13 55	Tennessee	8 70
Massachusetts	19 88	West Virginia	12 47
Rhode Island	18 75	Kentucky	12 19
Connecticut	20 12	Ohio	12 96
New York	15 33	Michigan	14 46
New Jersey	18 90	Indiana	10 63
Pennsylvania	15 65	Illinois	8 10
Delaware	17 26	Wisconsin	10 93
Maryland	15 43	Minnesota	8 30
Virginia	10 73	Iowa	7 30
North Carolina	8 88	Missouri	9 18
South Carolina	7 49	Kansas	10 37
Georgia	7 09	Nebraska	6 40
Florida	8 94	California	16 29
Alabama	6 76	Oregon	14 99
Mississippi	8 77	Nevada	21 88
Louisiana	12 07	The Territories	20 96

No. 6.—Table showing the average cash value per acre of farm-products for the year 1876.

STATES.	Corn.	Wheat.	Rye.	Oats.	Barley.	Buckwheat.	Potatoes.	Tobacco.	Hay.
Maine	$24 49	$18 96	$15 54	$11 27	$13 87	$13 95	$63 00	....	$10 97
New Hampshire	33 18	23 25	18 00	16 17	21 32	12 35	60 00	$180 00	11 05
Vermont	30 42	21 02	17 76	15 54	19 80	13 18	70 00	....	10 31
Massachusetts	26 25	23 40	12 15	15 30	22 50	8 45	83 00	154 16	16 32
Rhode Island	26 25	....	10 80	16 20	17 10	....	65 00	....	16 00
Connecticut	24 05	18 85	10 32	11 52	23 00	12 00	63 05	111 02	18 02
New York	20 41	19 65	9 84	11 97	18 26	10 36	44 00	58 80	12 88
New Jersey	20 16	17 95	10 93	11 13	....	9 54	48 00	....	19 08
Pennsylvania	19 25	16 50	10 36	10 01	18 70	10 06	42 50	124 20	14 95
Delaware	15 00	20 32	10 40	8 84	....	....	66 50	....	17 70
Maryland	14 21	15 87	10 26	7 31	....	11 89	46 72	55 20	17 40
Virginia	9 20	9 60	6 14	6 32	....	7 77	39 68	48 00	17 27
North Carolina	7 88	8 76	7 39	7 29	....	....	44 80	49 50	13 90
South Carolina	6 39	13 28	9 70	11 89	....	....	74 40	....	19 80
Georgia	6 60	8 04	....	7 88	....	....	....	....	19 14
Florida	8 60	....	....	13 36	....	....	....	140 00	....
Alabama	6 24	7 99	....	9 44	....	....	58 76	....	21 77
Mississippi	8 25	10 62	....	11 24	....	....	76 80	....	22 01
Louisiana	12 04	....	....	....	....	....	61 20	....	....
Texas	12 50	14 04	16 62	17 98	23 78	....	63 65	168 90	15 53
Arkansas	9 36	7 79	8 69	10 25	....	....	44 66	108 00	18 34
Tennessee	7 84	7 71	8 28	6 86	16 65	13 61	38 40	50 40	18 44
West Virginia	12 69	12 21	9 32	7 87	13 26	11 44	34 32	51 20	13 00
Kentucky	10 05	10 00	7 77	7 92	18 06	....	40 18	47 60	12 81
Ohio	13 94	13 45	8 70	8 21	15 60	9 15	43 40	52 65	10 10
Michigan	15 08	13 92	9 04	14 13	15 40	9 72	39 60	....	13 00
Indiana	10 20	11 22	8 66	7 03	12 00	13 07	36 40	42 75	10 71
Illinois	7 75	8 64	9 28	5 20	8 85	11 98	45 75	43 32	9 65
Wisconsin	13 94	9 09	8 82	9 30	14 30	10 98	39 20	48 00	10 85
Minnesota	10 16	7 65	9 76	9 25	13 79	9 57	34 56	....	7 00
Iowa	7 50	5 49	7 42	5 84	10 80	11 54	64 00	....	7 10
Missouri	7 78	11 03	8 43	5 25	11 05	12 06	31 92	54 25	11 50
Kansas	10 44	12 55	8 94	6 97	10 57	14 40	52 50	70 00	5 88
Nebraska	8 10	8 39	6 60	5 81	7 04	....	24 64	....	4 71
California	35 31	14 82	14 44	25 90	15 18	....	103 75	....	15 67
Oregon	27 00	11 90	15 75	19 00	19 72	....	89 60	....	13 77
Nevada	28 00	20 02	....	21 70	22 95	....	96 00	....	18 22
The Territories	23 75	18 20	....	20 40	24 92	....	79 20	....	16 80

No. 7.—Table showing the estimated total number and total value of each kind of live stock, and the average price, in January, 1877.

STATES.	HORSES.			MULES.			MILCH-COWS.		
	NUMBER.	AV'GE PRICE.	VALUE.	NUMBER.	AV'GE PRICE.	VALUE.	NUMBER.	AV'GE PRICE.	VALUE.
Maine	80,100	$71 21	$5,703,921	....	....	....	167,500	$30 00	$5,025,000
New Hampshire	56,000	67 95	3,805,200	....	....	....	98,200	32 20	3,162,040
Vermont	75,200	70 87	5,329,424	....	....	....	215,700	29 00	,255,300
Massachusetts	131,000	88 99	11,657,690	....	....	....	148,700	40 00	5,948,000
Rhode Island	14,500	94 62	1,371,990	....	....	....	20,400	37 50	765,000
Connecticut	52,100	75 83	3,950,743	....	....	....	112,000	38 12	4,269,440
New York	692,600	85 61	59 293,486	19,000	$90 92	$1,727,480	1,526,200	35 00	53,417,000
New Jersey	115,700	94 90	10,979,930	14,800	111 28	1,646,944	146,300	42 00	6,144,600
Pennsylvania	590,900	75 66	44,707,494	26,000	90 57	2 354,820	845,300	34 50	29,162,850
Delaware	19,600	76 80	1,505,280	4,000	99 30	397,200	23,000	34 00	782,000
Maryland	107,600	75 90	8,166,840	11,100	91 34	1,013,874	99,600	30 03	2,990,988
Virginia	198,700	64 54	12,824,098	29,800	79 42	2,366,716	229,200	21 88	5,014,896
North Carolina	141,000	70 30	9,912,300	52,700	73 87	3,892,949	203,000	15 26	3,097,780
South Carolina	57,400	82 29	4,723,446	45,500	92 08	4,189,640	162,400	20 00	3,248,000
Georgia	118,300	72 54	8,581,482	96,200	83 33	8,016,346	270,400	16 68	4,510,272
Florida	16,700	72 96	1,218,432	9,100	84 17	765,947	67,400	15 12	1,019,088
Alabama	105,400	62 91	6,630,714	102,400	69 56	7,122,944	171,500	17 78	3,049,270
Mississippi	90,800	69 21	6,284,268	96,100	86 70	8,331,870	178,000	18 48	3,289,440
Louisiana	77,000	56 31	4,335,870	79,100	76 29	6,034,539	89,600	20 71	1,855,616
Texas	785,800	30 23	23,754,734	112,900	49 42	5,579,518	505,100	14 53	7,339,103
Arkansas	162,000	47 96	7,769,520	85,900	60 19	5,170,321	165,700	15 30	2,535,210
Tennessee	321,100	55 28	17,750,408	99,800	59 88	5,976,024	225,700	18 82	4,247,674
West Virginia	114,100	55 34	6,314,294	2,400	59 36	142,464	125,500	26 53	3,329,515
Kentucky	368,300	53 19	19,589,877	82,400	51 25	4,223,000	247,100	29 18	7,210,378
Ohio	750,000	63 46	47,595,000	26,500	66 20	1,754,300	700,000	32 91	23,037,000
Michigan	305,800	75 19	22,993,102	3,800	93 21	354,198	368,300	31 74	11,689,842
Indiana	675,600	54 74	36,982,344	60,100	63 88	3,839,188	439,200	26 70	11.726,640
Illinois	1,102,600	58 62	64,634,412	113,300	68 08	7,713,464	724,900	27 87	20,202,963
Wisconsin	359,100	65 56	23,542,596	8,500	85 71	728,535	474,000	26 86	12,731,640
Minnesota	310,000	66 70	20,677,000	6,000	83 61	501,660	249,800	21 05	5,258,290
Iowa	726,900	58 65	42,632,685	37,700	75 90	2,861,430	665,300	23 56	15,674,468
Missouri	598,900	42 33	25,351,437	124,900	50 56	6,314,944	460,100	21 11	9,712,711
Kansas	234,100	50 31	11,777,571	26,200	65 41	1,713,742	273,400	23 26	6,359,284
Nebraska	111,000	68 00	7,548,000	9,000	95 61	860,490	85,200	26 83	2,285,916
California	260,000	39 50	10,270,000	26,500	67 75	1,795,375	381,900	30 64	11,701,416
Oregon	97,700	43 95	4,293,915	3,400	41 87	142,358	88,900	20 45	1,818,005
Nevada	11,000	43 00	473,000	1,100	71 00	78,100	10,000	31 50	315,000
The Territories	120,800	43 66	5,274,128	27,300	68 52	1,870,596	296,300	25 52	7,561,576
Total	10,155,400	....	$610,206,631	1,443,500	....	$99,480,976	11,260,800	....	$307,743,211
Grand av'ge of prices	....	$60 08	....	....	$68 91	....	....	$27 32	....

No. 8.—Table showing the estimated total number and total value of each kind of live stock, and the average price, in January, 1877—Continued.

STATES.	OXEN AND OTHER CATTLE.			SHEEP.			HOGS.		
	NUMBER.	AV'GE PRICE.	VALUE.	NUMBER.	AV'GE PRICE.	VALUE.	NUMBER.	AV'GE PRICE.	VALUE.
Maine	199,800	$25 78	$5,150,844	520,600	$2 90	$1,509.740	59,900	$10 11	$605,589
New Hampshire	119,100	29 01	3,455,091	242,400	2 66	644,784	38,700	14 99	580,113
Vermont	131,800	23 35	3 077,530	475,700	2 84	1,350,988	53,300	10 31	549,523
Massachusetts	110,400	40 81	4,505,424	61,000	3 67	223,870	78,600	14 80	1,163,280
Rhode Island	15,600	46 12	719,472	25.000	3 70	92,500	17,100	13 80	235,980
Connecticut	112,900	38 66	4,364,714	92,500	3 60	333,000	58,400	15 74	919,216
New York	663,200	30 15	19 995,480	1,897,700	3 58	6,793,766	580,000	9 30	5,394,000
New Jersey	82,100	38 18	3,134,578	125,800	4 87	612 646	151,400	9 56	1,447,384
Pennsylvania	701,000	26 01	18,233,010	1,607,600	3 17	5,096,092	901 200	9 48	8,543,373
Delaware	31,700	25 62	812,154	23,600	4 17	98,412	46,700	8 38	391,346
Maryland	116,900	21 09	2,465,421	144,000	3 68	529,920	252,100	6 68	1,684,028
Virginia	393,500	17 12	6,736,720	367,000	2 81	1,031.270	607,400	4 58	2,781,892
North Carolina	316,300	10 63	3,362,269	281,000	1 54	432,740	735,500	4 20	3,089.100
South Carolina	184,800	11 95	2,208,360	144,100	1 82	262,262	284.100	4 18	1,187,538
Georgia	404,900	9 30	3,765,570	378,600	1 63	617,118	1,483,100	3 59	5,324,329
Florida	363,400	6 44	2,340,296	40 400	2 02	81,608	166,600	2 72	453,152
Alabama	330.500	9 96	3,291,780	195,100	1 71	333,621	793,600	3 47	2,753,792
Mississippi	310,100	10 81	3,352,181	163,900	1 72	281,908	1,189.300	3 66	4,352,838
Louisiana	171,900	10 02	1,722,438	71,500	1 87	133,705	242,600	3 74	907,324
Texas	3,390,500	9 24	31,328,220	2,826,700	2 04	5,766,468	1,144,500	4 12	4,715,340
Arkansas	261,300	10 33	2,699,229	190,400	1 77	337,008	1,000.300	3 57	3,571.071
Tennessee	317,200	10 92	3,463,824	345,100	2 01	693,651	1,087,900	4 31	4,688,849
West Virginia	235,200	20 92	4,920,384	544,500	2 30	1,252,350	270 700	4 74	1,283,118
Kentucky	377,900	21 47	8,113,513	690,400	2 79	1,926,216	1,588,200	5 46	8,671,572
Ohio	775,000	23 37	18,111,750	3,900,000	2 52	9,828,000	1,755 700	7 57	13,290,649
Michigan	397,700	24 18	9,616,386	2,100,000	2 72	5,712,000	505,600	7 36	3,721,216
Indiana	764,500	17 72	13,546,940	1,175,000	2 23	2,620,250	2,375.000	6 55	15,556.250
Illinois	1,287,000	21 20	27,284,400	1,258,500	2 50	3,146,250	2,750.000	8 00	22,000,000
Wisconsin	466,800	21 22	9,905,496	1,151,100	2 45	2,820,195	562,300	6 71	3,773,033
Minnesota	339,300	18 07	6,131,151	209,200	2 33	487,436	215,500	5 72	1,232,660
Iowa	958,800	17 82	17,085,816	1,680,500	2 29	3,848,345	3.263,200	7 29	23,788,728
Missouri	846,300	17 17	14,530,971	1,297,000	1 91	2,477,270	2,560,000	5 45	13,952,000
Kansas	525,000	17 09	8,972,250	142,400	2 41	343,184	359,800	7 92	2,849,616
Nebraska	195,400	20 86	4,076,044	60,600	2 75	166,650	170,500	7 18	1,224,190
California	1,053,500	16 52	17,403,820	7,290,000	1 40	10,206 000	417,700	6 20	2,589,740
Oregon	147,200	11 80	1,736,960	859,700	1 80	1,547,460	188,700	3 42	645,354
Nevada	48,100	19 00	913,900	24,000	2 10	50,400	5,400	9 00	48,600
The Territories	809,500	18 00	14,571,000	3,201,600	2 25	7,203,600	116.500	9 54	1,111,410
Total	$17,956,100	....	$307,105,386	35,804,200	....	$80 892,683	28,077,100	....	$171.077,196
Grand av'ge of prices	....	$17 10	....	....	$2 27	....	....	$6 09	....

In the production of Indian corn in 1876 Pennsylvania ranked ninth, producing 42,250,000 bushels. In 1870 it ranked eighth, producing 34,702,006 bushels. In 1860 it ranked thirteenth, producing 28,196,821 bushels. In 1850 it ranked twelfth, producing 19,835,214 bushels. In 1840 it ranked eleventh, producing 14,240,022 bushels. It thus appears that in the six years ending with 1870 Pennsylvania had made considerable progress as a corn-producing State. By reference to the first table it will be observed that in 1876 it stood first in this respect among the Atlantic States, more than doubling the product of New York. Tennessee was the leading corn-producing State in 1840, Ohio in 1850, and Illinois in 1860 and 1870 and 1876.

In the production of wheat Pennsylvania ranked fifth in 1876, producing 18,740,000 bushels, against 9,750,000 bushels by New York. It was exceeded only by Ohio, with 21,750,000 bushels; Indiana, with 20,000,000 bushels; Illinois, with 23,440,000 bushels; and California, with 30,000,000. In 1870 Pennsylvania again ranked fifth among the wheat-growing States, producing 19,672,367 bushels, against 27,882,159 bushels by Ohio; 27,747,222 bushels by Indiana; 30,128,405 bushels by Illinois; and 25,606,344 bushels by Wisconsin. In 1860 Pennsylvania was sixth in rank, producing 13,042,165 bushels, against 13,130,977 bushels by Virginia; 15,119,047 bushels by Ohio; 15,657,458 bushels by Wisconsin; 16,848,267 bushels by Indiana; and 23,837,023 bushels by Illinois. In 1850 Pennsylvania was the first wheat-growing State in the Union, producing 15,367,691 bushels, against 14,487,351 bushels by Ohio; 13,121,498 bushels by New York; 11,212,616 bushels by Virginia; 6,214,458 bushels by Indiana; 9,414,575 bushels by Illinois; 17,328 bushels by California; and 1,401 bushels by Minnesota. In 1860 and 1870 Illinois was the leading wheat-producing State, and in 1876 California secured this honor. As Pennsylvania produced less wheat in 1876 than in 1870, and increased her wheat product in the period from 1850 to 1876 by less than thirty-three per cent., it can not be claimed for her that she has made satisfactory progress in the production of this great staple; but she has more than maintained the position of superiority among the Atlantic States which she occupied in 1850, for, while they have either decreased their production since that year or kept it stationary, she has materially increased hers. She appears, too, to be fast overtaking Ohio in the production of wheat, and, if other Western States do not copy her methods of maintaining the fertility of the soil, it is not improbable that she may again take rank above them.

In the production of rye in 1876 Pennsylvania, producing 3,240,000 bushels, was outranked by only one State, and that one of the youngest in the Union, Kansas, which produced 3,450,000 bushels. Four other States produced rye in proportionately large quantities, namely, New York, 2,700,000 bushels; Kentucky, 1,150,000 bushels; Illinois, 2,580,000 bushels; and Wisconsin, 1,330,000 bushels. These six States produced in 1876 seven-tenths of all the rye produced in the country. In 1870 Pennsylvania ranked first, with 3,577,641 bushels; New York being next, with 2,478,125 bushels; followed by Illinois, with 2,456,578 bushels. In 1860 Pennsylvania and New York produced nearly one-half of all the rye produced in the Union—Pennsylvania's product being 5,474,788 bushels, and that of New York being 4,786,905 bushels. In 1850 Pennsylvania was again first in the list of rye-producing States, and was again closely followed by New York—their respective products being, Pennsylvania, 4,805,160 bushels, and New York, 4,148,182 bushels. The total production of rye in the country was 18,645,567 bushels in 1840; 14,188,813 bushels in 1850; 21.101,380 bushels in 1860; 16,918,795 bushels in 1870; and 20,374,800 bushels in 1876. It will be seen that, while the production has greatly fluctuated since 1840, there is reason for the opinion that the average annual production since that year has been no greater than it was then; while the production by both Pennsylvania and New York has steadily declined. New Jersey has also greatly retrograded as a rye-producing State since 1850. Its product in that year was 1,255,578 bushels; in 1860, 1,439,497 bushels; in 1870, 566,775 bushels; and in 1876, 520,000 bushels.

In the production of oats in 1876 Pennsylvania was excelled by only two States, New York and Illinois. New York produced 40,025,000 bushels; Illinois, 48,000,000 bushels; and Pennsylvania, 33,150,000 bushels. Ohio produced 24,500,000 bushels; Wisconsin, 21,700,000 bushels; Iowa, 21,250,000 bushels; and Michigan, Missouri, Minnesota, Kansas, and Indiana each over 10,000,000 bushels. In 1870 Illinois produced 42,780,851 bushels; New York, 35,293,625 bushels; Pennsylvania, 36,478,585 bushels; and Ohio, 25,347,549 bushels. In 1860 New York produced 35,175,134 bushels; Pennsylvania, 27,387,147 bushels; Ohio, 15,409,234 bushels; and Illinois, 15,220,029 bushels. Wisconsin came next, with 11,059,260 bushels, and Virginia next, with 10,186,720 bushels. In 1850 New York produced 26,552,814 bushels; Pennsylvania, 21,538,156 bushels; Ohio, 13,472,742 bushels; Virginia, 10,179,144 bushels; and Illinois, 10,087,241 bushels. Kentucky produced 8,201,311 bushels; Tennessee, 7,703,086 bushels; Indiana, 5,655,014 bushels; Missouri, 5,278 079 bushels: all other States less than 5,000,000 bushels. Wisconsin produced only 3,414,672 bushels. Pennsylvania appears in the above statistics to good advantage as an oat-producing State, but its progress during the past few years is apparently inconsiderable, as is that of Ohio, while that of New York, Illinois, and some other Western States is quite marked. Kentucky and Tennessee have retrograded—the former producing only 6,850,000 bushels in 1876; and the latter, 5,400,000 bushels.

In the production of barley in 1876 Pennsylvania supplied a comparatively insignificant quantity. She was surpassed by many States—California producing twentyfold as much, New York twelve times as much, and Iowa tenfold as much. In 1860 the product of Pennsylvania was 530,714 bushels; and in 1876 it had increased to only 560,000 bushels. This crop is a very subordinate one in Pennsylvania, and is a favorite one in New York, California, and Iowa.

In the production of buckwheat in 1876 Pennsylvania, which has sometimes been contemptuously termed "the buckwheat State," was surpassed by New York, which produced 3,750,000 bushels, while Pennsylvania produced 2,100,000 bushels. In 1870 New York produced 3,904,030 bushels; and Pennsylvania, 2,532,173 bushels. In 1860 Pennsylvania produced 5,572,024 bushels; New York, 5,126,307 bushels; Ohio, 2,370,650 bushels; and New Jersey, 877,386 bushels. In 1850 New York produced 3,183,955 bushels; Pennsylvania, 2,193,692 bushels; New Jersey, 878,934 bushels; and Ohio, 638,060 bushels. The total production of buckwheat in the United States in 1876 was 9,668,800 bushels; in 1870, 9,821,721 bushels; in 1860, 17,571,818 bushels; in 1850, 8,956,912 bushels. The above figures show that the production of buckwheat is declining in the United States, and in Pennsylvania.

In the production of potatoes in 1876 Pennsylvania is surpassed by several States, and notably so by New York. The statistics for the principal States which produced potatoes in that year are as follows: New York, 23,000,000 bushels; Illinois, 9,450,000 bushels; Ohio, 9,000,000 bushels; Iowa, 7,000,000 bushels; Pennsylvania, 6,800,000 bushels; and Maine, Wisconsin, Missouri, Kansas, and Vermont each over 5,000,000 bushels; all other States under 5,000,000 bushels. In 1870 New York produced 28,558,249 bushels; Pennsylvania, 13,020,939 bushels; Ohio, 11,423,109 bushels; Illinois, 11,267,431 bushels; Michigan, 10,322,450 bushels; Maine, 7,771,363 bushels; Iowa, 5,948,912 bushels; North Carolina, 3 810,643 bushels; Georgia, 2,818,663 bushels; Alabama, 2,033,872 bushels. In 1860 New York produced 26,454,923 bushels; Pennsylvania, 11,790,654 bushels; Ohio, 8,999,546 bushels; North Carolina, 6,970,604 bushels; Georgia, 6,812,330 bushels; Alabama, 5,931,563 bushels; Maine, 6,376,052 bushels; and Vermont, Michigan, New Jersey, and Illinois each above 5,000,000 bushels. Potatoes are an uncertain crop, and the production in any given year may not afford a true indication of the average annual yield in any State, but it appears to be certain that Pennsylvania is retrograding in their production. New soils and cool summers are best adapted to the production of Irish potatoes, conditions which partly account for the shrinkage in this crop in Pennsylvania; but this explanation will not account for the decline in the sweet potato crop in several of the Southern States since 1860.

In the production of tobacco in 1876 Pennsylvania ranks high, being ninth in the list. Of the Northern States it is surpassed only by Indiana, while its product is almost twice as large as that of Connecticut, and more than three times as large as that of Massachusetts. In 1870 Indiana produced 9,325,392 pounds; Connecticut, 8,328,798 pounds; Illinois, 5,249,274 pounds; Massachusetts, 7,312,885 pounds; Pennsylvania, 3,467,539 pounds; and New York, 2,349,798 pounds.

In 1860 Indiana produced 7,993,378 pounds; Illinois, 6,885,262 pounds; Connecticut, 6,000,133 pounds; Pennsylvania, 3,181,586 pounds; New York, 5,764,582 pounds; and Massachusetts, 3,233,198 pounds. It is a reasonable supposition that Pennsylvania will in a few years become the leading Northern State in the production of tobacco.

In the production of hay in 1876 Pennsylvania was only surpassed by New York and Illinois. In that year the production of these States was as follows: New York, 5,600,000 tons; Illinois, 3,500,000 tons; Pennsylvania, 2,900,000 tons. Ohio produced 1,950,000 tons, and Iowa, 1,950,000 tons. In 1870 the production in these leading States was as follows: New York, 5,614,205 tons; Pennsylvania, 2,848,219 tons; Illinois, 2,747,339 tons. Ohio produced 2,289,565 tons, and Iowa, 1,777,339 tons. In 1860 New York produced 3,564,793 tons; Pennsylvania, 2,245,413 tons; Illinois, 1,774,554 tons; Ohio, 1,564,502 tons; all other States, below 1,000,000 tons each. In 1850 New York produced 3,728,797 tons; Pennsylvania, 1,842,970 tons; Ohio, 1,443,142 tons; all other States below 1,000,000 tons each.

Although the figures in the fourth table show that Pennsylvania agriculture does not occupy the first nor even the second place in an analysis of the average yield per acre of the leading crops produced in the whole country, they nevertheless demonstrate the fact that the farming of the State is uniformly good. The State that will produce an average of 35 bushels of corn to the acre, $13\frac{2}{10}$ bushels of wheat, 14 bushels of rye, $28\frac{6}{10}$ bushels of oats, 22 bushels of barley, $13\frac{6}{10}$ bushels of buckwheat, 50 bushels of potatoes, 1,380 pounds of tobacco, and $1\frac{23}{100}$ tons of hay, need not blush for its farmers, although it might do better, and certainly has done better, especially in the growing of potatoes. So, too, the figures of prices in the fifth and sixth tables are equally satisfactory. The following table shows the product of each principal crop of Pennsylvania, the yield per acre, the total acreage, the average price, and the value of each crop, in 1876.

PRODUCTS.		Quantity produced in 1876.	Average yield per acre.	Number of acres in each crop.	Value per bushel, pound, or ton.	Total Valuation.
Indian Corn	bushels..	42,250,000	35	1,207,142	$0.55	$23,237,500
Wheat	do. ..	18,740,000	13.2	1,419,696	1.25	23,425,000
Rye	do. ..	3,240,000	14	231,428	74	2,397,600
Oats	do. ..	33,150,000	28.6	1,159,090	35	11,602,500
Barley	do. ..	560,000	22	25,454	85	476,000
Buckwheat	do. ..	2,100,000	13.6	154,411	74	1,554,000
Potatoes	do. ..	6,800,000	50	136,000	85	5,780,000
Tobacco	pounds..	13,200,000	1,380	9,565	09	1,188,000
Hay	tons..	2,900,000	1.23	2,357,723	12.16	35,264,000
Total		....	....	6,700,509	....	$104,924,600

Coming to the tables relating to domestic animals, we find that in 1876 Pennsylvania is surpassed in the number of its horses by New York, Texas, Ohio, Indiana, Illinois, Iowa, and Missouri; that, in the number of its mules, its rank among the States is still lower; that, in the number of its milch cows, it is surpassed only by New York; that, in the number of its oxen and other cattle, it is surpassed by Texas, Ohio, Indiana, Illinois, Iowa, Missouri, and California; that, in the number of its sheep, it is surpassed by New York, Texas, Ohio, Michigan, Iowa, and California; and that, in the number of its hogs, it is surpassed by eleven States, but is itself at the head of the list of Eastern States.

Turning again to the statistics of the census of 1870, we find that in the production of wool Pennsylvania ranked very high, being fifth in the list. Ohio produced 20,539,643 pounds; California, 11,391,743 pounds; New York, 10,599,225 pounds; Michigan, 8,726,145 pounds; and Pennsylvania, 6,561,722 pounds. Indiana and Illinois each produced above 5,000,000 pounds, but no other State produced this quantity. The total wool production of 1870 was 100,102,387 pounds.

In the production of dairy products in 1870 Pennsylvania was surpassed only by New York in the manufacture of butter, the figures being as follows: New York, 107,147,526 pounds; Pennsylvania, 60,834,644 pounds. The States which came next to Pennsylvania were, Ohio, with 50,266,372 pounds; and Illinois, with 36,083,405 pounds. In the production of cheese in 1870 nine States surpassed Pennsylvania, which produced only 1,145,209 pounds in a total for the whole country of 53,492,153 pounds. The proportion of New York was enormous, being 22,769,964 pounds. No other State produced one-sixth this amount.

In the production of maple sugar in 1870 Pennsylvania ranked below several other States. As the opinion has been widely entertained that Pennsylvania annually produces large quantities of this kind of sugar and its accompanying product of maple syrup, we present below a table showing exactly its rank in this branch of agricultural industry in the last three census years:

STATES.	SUGAR.			SYRUP.		
	1870	1860.	1850.	1870	1860.	1850.
	Pounds.	*Pounds.*	*Pounds.*	*Gallons.*	*Gallons.*	*Gallons.*
Illinois..............	136,873	134,195	248,904	10,378	20,048	8,354
Indiana..............	1,332,332	1,541,761	2,921,192	227,880	292,908	180,325
Iowa..................	146,490	315,436	78,407	9,315	11,405	3,162
Kentucky.............	269,416	380,941	437,405	49,073	140.076	30,079
Maine..................	160,805	306,742	93,542	28,470	32,679	3,167
Massachusetts.	399,800	1,006,078	795,525	2,326	15,307	4,693
Michigan............	1,781,855	4,051,822	2,439,794	23,637	78,998	19,823
Minnesota............	210,467	370,669	2,950	12,722	23,038	....
Missouri.............	116,980	142,028	178,910	16,317	18,289	5,636
New Hampshire.....	1,800,704	2,255,012	1,298,863	16,884	43,833	9,811
New York............	6,692,040	10,816,419	10,357,484	46,048	131,843	56,539
Ohio....................	3,469,128	3,345,508	4,588,209	352,612	370,512	197,308
Pennsylvania.	1,545,917	2,767,335	2,326,525	39,385	114,310	50,652
Tennessee...........	134,968	115,620	158,557	4,843	74,372	7,223
Vermont..............	8,894,302	9,897,781	6,349,357	12,023	16,253	5,997
Virginia.............	245,093	938,103	1,227,665	11,400	99.605	40,322
West Virginia.......	490,606	....	....	20,209	....	....
Wisconsin............	507,192	1,584,451	610,976	31,218	83,118	9,874
United States..	28,443,645	40,120,205	34,253,436	921,057	1,597,589	106,782

In the production of honey in 1870 Pennsylvania produced 796,989 pounds in a total of 14,702,815 pounds. Seven States surpassed it, namely, Illinois, Kentucky, Iowa, Missouri, New York, North Carolina, and Tennessee.

In the total estimated value in 1870 of all its farm productions, including betterments and additions to stock, Pennsylvania ranked fourth, being surpassed by New York, Illinois, and Ohio, in the order named. The figures respectively were as follows: New York, $253,526,153; Illinois, $210,860,585; Ohio, $198,256,907; Pennsylvania, $183,946,027. Only three other States attained in that year to $100,000,000, namely, Indiana, $122,914,302; Iowa, $114,386,441; and Missouri, $103,035,759. These figures are the real test of the position of Pennsylvania as an agricultural State. While they place her fourth in the list in 1870, her people need not be without hope that the natural fertility of her soil, its adaptation to a mixed husbandry, which is always in the end the best husbandry, and the industry and progressive spirit of her farmers, will, ere many decades have rolled around, place the State still nearer the head of the list. Her people are not deserting their farms, as are the people of New England; they are not wearing out their lands, as are the people of the South; and they do not limit their energies to the production of one or two crops, as do the people of many Western States.

The three leading counties of Pennsylvania in the production of the principal agricultural commodities in 1870 were as follows: Indian corn—Lancaster, 2,820,825 bushels; Chester, 1,540,125 bushels; York, 1,531,541 bushels: wheat—Lancaster, 2,077,413 bushels; York, 1,129,750 bushels; Berks, 930,653 bushels: rye—Berks, 281,867 bushels; Butler, 179,577 bushels; Lehigh, 162,147 bushels: oats—Lancaster, 1,943,577 bushels; York, 1,444,763 bushels; Berks, 1,425,157 bushels: barley—Washington, 128,367 bushels; Erie, 100,014 bushels; Allegheny, 69,946 bushels: buckwheat—Bradford, 382,581 bushels; Luzerne, 197,160 bushels; Susquehanna, 177,864 bushels: Irish potatoes—Adams, 1,005,303 bushels; Allegheny, 769,144 bushels; Luzerne, 573,322 bushels: sweet potatoes—Lancaster, 33,821 bushels; York, 29,905 bushels; Adams, 15,998 bushels: tobacco—Lancaster, 2,692,584 pounds; York, 527,808 pounds; Bucks, 151,372 pounds: wool—Washington, 1,862,752 pounds; Greene, 444,489 pounds; Beaver, 421,907 pounds: butter—Bradford, 3,704 709 pounds; Montgomery, 3,104,748 pounds; Bucks, 2,861,557 pounds: cheese—Crawford, 196,039 pounds; Montgomery, 195,057 pounds; Erie, 165,739 pounds: hay—Bradford, 129,956 tons; Lancaster, 124,185 tons; Bucks, 118,014 tons: honey—Bradford, 139,215 pounds; Tioga, 44,372 pounds; Washington, 39,950 pounds: maple sugar—Somerset, 674,326 pounds; Tioga, 145,209 pounds; Crawford, 99,592 pounds: maple molasses—Somerset, 5,898 gallons; Fayette, 5,323 gallons; Mercer, 4,970 gallons: sorghum molasses—Greene, 53,845 gallons; Fayette, 42,935 gallons; Washington, 32,770 gallons:

horses owned—Lancaster, 21,409; Berks, 16,783; Westmoreland, 15,144: mules and asses—York, 2,642; Lancaster, 2,504; Bucks, 1,643: milch cows—Bradford, 35,243; Chester, 32,670; Berks, 32,112: working oxen—Chester, 3,371; Wayne, 2,707; Bradford, 2,223: other cattle—Lancaster, 32,249; Bradford, 25,052; Crawford, 23,721: sheep—Washington, 426,621; Greene, 121,135; Beaver, 98,300: swine—Lancaster, 50,070; York, 40,083; Berks, 37,553.

We can not more appropriately close this sketch of the agricultural development of Pennsylvania down to 1876 than by reproducing the following tribute to the State from the pen of Mr. H. V. Redfield, a New England gentleman of established literary reputation, who has traveled much throughout our country and commented at length upon its varied resources. He bears the following testimony to the agricultural wealth of Pennsylvania in a published letter written at Lancaster, October 16, 1877, for the Philadelphia *Times*.

> The soil of Pennsylvania is ample to support all the population of the State and three times as many more—so that the overcrowded centres need not of necessity empty themselves West or South. Of course there is more room West and South, but there is also plenty of room in Pennsylvania and a soil of almost unlimited capacity. The more I see of Pennsylvania and the system of agriculture which prevails, the more am I impressed with its agricultural wealth. The soil is continually increasing in richness, and every year adds to its producing capacity. Any soil will increase in fertility where that which is taken from it is returned in the shape of manures, and this is the secret of the growing agricultural wealth of Pennsylvania. Among the farmers of no State of my acquaintance have I seen such uniform husbandry of everything that goes to enrich the soil. Even along the rich low grounds bordering the Susquehanna, where nature has most generously endowed the soil with fertility, I see great heaps of lime, ashes and barnyard manure ready to be scattered over the surface or plowed under at the proper season. No Pennsylvania farmer that I have met would think of cropping his land year after year without returning to the soil each season all the available manure from his stables, barns, and even pigpens and ash heaps. By this system the soil becomes richer year after year, and there is no setting a limit to its future capacity. It is a striking fact that most of the farms of this State will produce twice as much to-day as when they were "fresh." Old land is the best, because it has, by a careful system of manuring, been brought up to a higher standard of fertility than when first cleared. Talk about limiting the capacity of the soil where such a system of agriculture prevails! Pennsylvania is rich in coal and lumber and iron, but she is richer than all in the soil which responds so bountifully to the intelligent system of agriculture which prevails. The coal, the iron, and the lumber can be exhausted, but by no possibility can the soil be when that which is taken from it is returned. Under this intelligent system the land becomes more and more capable each year, more and more adequate to the support of a dense population.
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> Indeed, the traveler who observes closely the mineral and agricultural wealth of Pennsylvania finds within her borders all the elements of great prosperity, and he is almost ready to predict that she is to be the Empire State of the future. Her growth is more rapid than New York, having more than doubled in population since 1840, while New York lacks half a million of having doubled in the same period. In 1860 New York was 974,000 ahead, and in 1870 but 860,000, showing a per cent. of increase by Pennsylvania that will put her ahead of the present "Empire State" within the lifetime of many now living. New York has not always, as is generally supposed,

been the leading State in population, and it is possible that place of honor will remain to her not many decades more. Until 1820 Virginia was the leading State, at which census she fell to the second place, New York taking the lead, and Pennsylvania being third. In 1830 Virginia fell to the third place, and in 1840 to the fourth place, Pennsylvania meantime keeping close to New York. It is a singular fact that when the first Federal census was taken, in 1790, Virginia had almost as large a population as New York and Pennsylvania combined! The total population of these two States was 771,493, while Virginia had 747,610. The race is now between New York and Pennsylvania, with New York ahead to the number of 860,957 at the last census. But the increase in Pennsylvania the past thirty years has been a larger per cent. than in New York, a ratio that, if continued, will as surely put the Keystone State at the head as time rolls. Virginia, we may say, is no longer in the race. Ohio occupies the third place, having taken the position in 1840, and maintained it ever since. The rapidity with which she has come up can be realized when we reflect that in 1800 she had but 45,365 population, ranking as the eighteenth State in importance. Pennsylvania is not a very large State, the number of square miles of surface being about the same as Tennessee, but less than Mississippi, Alabama, Florida, Georgia, North Carolina, Wisconsin, Michigan, etc., from which we learn that size is not always a test of power. But there is little of her surface which is not rich either in forest, coal or fertility of soil, and frequently all combined. Even remove the coal and lumber wealth, and Pennsylvania would still be a very rich State, the area of fertile soil being so large compared with that which is barren. There is little really poor soil in Pennsylvania—I mean little that will not repay intelligent husbandry. In one of the poorest sections of the State, at an altitude above the sea of 2,000 feet, I have seen potatoes dug out of the so-called "poor soil" at the rate of two hundred bushels to the acre! No man can starve upon soil which will do this unless he does it as a matter of "local option."

PENNSYLVANIA LUMBER.

To show the relative position of Pennsylvania among the lumber-producing States, it will not be necessary that we go farther back than the census of 1860 and 1870. Below we present the statistics for these two years of the value of all lumber products in each State and Territory of the Union, these products being laths, lumber proper, shingles, staves, shooks, headings, etc. Statistics for 1876 are not obtainable.

STATES.	1870.	1860.	STATES.	1870.	1860.
Alabama	$1,359,083	$1,875,628	Montana	$430,957	....
Arizona	10,000	....	Nebraska	278,205	$335,340
Arkansas	1,344,403	1,158,902	Nevada	432,500	....
California	5,227,064	4,003,431	New Hampshire	4,286,142	1,293,706
Colorado	324,370	....	New Jersey	2,745,317	1,623,160
Connecticut	1,541,038	589,456	New Mexico	121,225	45,150
Dakota	72,280	....	New York	21.238,228	10,597,595
Delaware	405,041	276,161	North Carolina	2,000,243	1,176,013
Dist. of Columbia,	30,000	21,125	Ohio	10,235,180	5,279,883
Florida	2,235,780	1,476,645	Oregon	1,014,211	690,008
Georgia	4,044,375	2,429,196	Pennsylvania	28,938,985	10,994,060
Idaho	56,850	....	Rhode Island	257,258	76,114
Illinois	4,546,769	2,681,295	South Carolina	1,197,005	1,125,640
Indiana	12,324,755	4,452,114	Tennessee	3,390,687	2,228,503
Iowa	5,794,285	2,185,206	Texas	1,960,851	1,754,206
Kansas	1,736,381	1,563,487	Utah	661,431	145,505
Kentucky	3,662,086	2,495,820	Vermont	3,525,122	928,541
Louisiana	1,212,037	1.575,995	Virginia	2,111,055	2,218.962
Maine	11,395,747	7,167,760	Washington	1,307,585	1,194,360
Maryland	1,501,471	609,044	West Virginia	1,478,399	....
Massachusetts	3,556,870	2,353,153	Wisconsin	15,130,719	4,616,430
Michigan	31,946,396	7,303,404	Wyoming	268,000	....
Minnesota	4,299,162	1,257,603			
Mississippi	2,160,667	1,832,227	Total	$210,159,327	$96,715,854
Missouri	6,363,112	3,085,026			

The above table shows that Pennsylvania in 1860 was the first lumber-producing State in the Union, closely followed by New York. In 1870 Pennsylvania fell to the second place, Michigan occupying the position of honor at the head of the list of States. New York was third in the list. Marvelous as was the development of the lumber interest in Michigan and some other extreme Northern States in the decade between 1860 and 1870, Pennsylvania also made a wonderful stride, the value of her product increasing from $10,994,060 in 1860 to $28,938,985 in 1870. New York fell far behind Pennsylvania in 1870. In the table only the value of the total lumber product of each State and Territory is given, but the amount of capital invested and wages paid in the whole country and in Pennsylvania in 1860 and in 1870 are worthy of a place in this record, and we give them as follows:

POLITICAL DIVISIONS.	Capital invested.		Wages paid.	
	1870.	1860.	1870.	1860.
United States	$143,493,232	$74,530,090	$40,009,162	$21,702,265
Pennsylvania	24,804,304	10,978,464	5,261,576	2,485,103

Pennsylvania at an early day became prominent in the production of lumber. The pine forests of the Susquehanna region have long been drawn upon for contributions to the lumber wants of the country, the supply thence obtained being rafted down the Susquehanna river, either sawed or in logs, to Eastern markets. Later, the extensive pine forests of the Allegheny valley were invaded, and Pittsburgh, by means of the rafting facilities afforded by the Allegheny river, became a great lumber market, supplying the Ohio and Mississippi valleys with vast quantities of pine lumber. Other sections of the State, as well as the two prominent sections above mentioned, have also long furnished considerable supplies of hard wood lumber, such as walnut, maple, cherry, hickory, and oak. Since about 1850 the manufacture of shooks, for use in the West Indian sugar trade, has been an extensive branch of the lumber interest of Pennsylvania, the oak timber required being principally found on the eastern and western slopes and on the summit itself of the Allegheny mountains. Although a large part of the Allegheny valley has been almost denuded of its pine forests, and some portions of the Susquehanna lumber region have shared a similar fate, it may be said that the State is still heavily timbered, and that many years must elapse before its forests will disappear.

Of the counties in Pennsylvania which manufactured lumber in 1870 the following were most prominent: in the eastern part of the State, Lycoming sawed in that year lumber amounting to $5,173,796; Clinton, $2,113,946; and Luzerne, $1,466,987: in the western part of the State, Warren sawed to the amount of $1,115,696; Allegheny, $1,067,353; and Crawford, $905,263. It will be understood that the counties which manufacture lumber do not necessarily produce the timber which is used in their saw-mills, but the census makes no record of the logging operations of any county.

The following description of the development of the lumber business of Warren county, the most important as well as the earliest lumber-producing county in the Allegheny valley, possesses historical value and is entitled to a place in these pages. It is taken from a paper on Warren county contributed to Egle's *History of Pennsylvania* by Samuel P. Johnson.

> The lumbering business, commencing nearly with the present century, exhibited its infancy and primitive character for many years in water mills and single upright saws, driven by overshot or flutter wheels, working only at certain stages of water, and subject to suspension by ice, flood, and drouth. A mill that would cut one hundred thousand feet per annum was considered a good investment. Floating lumber to market in rafts was commenced by Daniel Jackson on the Conewango, and by Darius and Joseph Mead on the Brokenstraw, in 1801. For halting and tieing up rafts, halyard and hickory splint cables were mostly used for some years, the latter being manufactured by George Gregg on the Brokenstraw.
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> In 1805 a new trade sprung up, in the boating of seasoned lumber from the Brokenstraw to New Orleans. Several trips were thus made during this and the following years, and good profits realized, though at great hazards. The late William B. Foster, of Pittsburgh, and Colonel William Magaw, of Meadville, were engaged in that enterprise. Of the pilots and hands employed, Daniel Horn and some others would return by sail vessels to Baltimore, and from thence travel home on foot. Dan. McQuay and some others made some return trips on foot all the way from New Orleans. Such lumber, the best quality, of course, brought there forty dollars per thousand feet. From this small beginning, the lumber business, under the management and energy of the Meads and McKinneys, Elijah Smith, Daniel Horn, Dr. William A. Irvine, and others on the Brokenstraw; Guy C. Irvine, Robert Russel, Jacob Hook, Robert Miles, Josiah and Orvis Hall, and others on the river and Conewango creek, acquired huge dimensions, until at the springtime freshets these streams would seem almost covered for miles with floating rafts. Pittsburgh, Wheeling, Cincinnati, Louisville, St. Louis, and other intermediate towns, had grown up in the meantime, and opened their markets for lumber. Re-action wheels, steam-mills, circular and gang saws, had superseded the flutter wheel and lonesome single saw, and millions of feet were now made where thousands were before.
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> This business reached and passed its summit between the years 1832 and 1840, when it took the down grade, and has now, by the failure of the timber, dwindled to a mere fraction of what it was.

A large part, perhaps the half, of the lumber product of the United States is composed of white and yellow pine, principally the former. The following table of the pine lumber product of the country in the year 1875 is taken from a paper in *Scribner's Monthly* for December, 1877, account being taken only of the large lumber mills; the smaller ones, which are operated only for local consumption, not being noted. Nor are the shingles, staves, wagon stuff, tub and pail, and other minor wooden products included The same writer places the total lumber product of the United States for the same year at 10,000,000,000 feet, all kinds of lumber being included.

Michigan	feet,	2,746,866,181	Georgia	feet,	17,750,000
Wisconsin	"	1,036,576,900	Florida	"	26,300,000
Minnesota	"	342,623,171	Alabama	"	7,500,000
Mississippi River	"	291,487,000	Pacific Coast	"	405,000,000
Pennsylvania	"	263.820,000			
New York	"	10,680,000		Total feet,	5,193,947,252
Maine	"	45,344,000	Other lumber	feet,	4,806,052,748

The figures for Florida are supposed to be too low, and those for the Pacific Coast embody only a careful estimate; the remaining figures are authentic. The lumber produced on the Pacific Coast, it is proper to state, is not a true pine, but is fir, cedar, and red wood.

Of the product of Pennsylvania above given, Williamsport produced 182,270,000 feet; Lock Haven, 47,325,000 feet; and other points 34,225,000. It is a curious contrast to the above figures for Pennsylvania which is afforded by a statement that is rather boastfully given in Gordon's *Gazetteer of Pennsylvania.* In a notice of the resources of Tioga county, in the Upper Susquehanna region, the historian states that, "from Pine creek, the principal scene of the lumber trade, more than 5,000,000 feet of sawed lumber were sent to market in the spring of 1832"—a large product for that day, but how small when compared with the product of Pennsylvania in 1875!

The following description of the great boom on the Susquehanna at Williamsport, by E. S. Watson, in Egle's *History of Pennsylvania*, will form an appropriate conclusion to this chapter.

> The great boom in the river at Williamsport, which was erected for the purpose of holding the logs floated down the stream from the pineries above, until they could be taken out and manufactured into boards, is one of the largest in the United States. To briefly give the origin of this mammoth enterprise, it will be necessary to refer back to 1845, when James H. Perkins arrived in Williamsport in company with John Layton, for the purpose of establishing a boom. Soon after their arrival they fixed upon the Long Reach, a few miles above the town at that day, but now partly embraced within the city limits, as the best point for locating the boom. The Legislature was petitioned for a charter, which was granted, and bears date March 17, 1846. The logs, as they floated down upon the high water, continued to be caught by men in small boats and tied into rafts up to the spring of 1849, when two temporary booms, with sunken cribs, were put in. In the fall of 1849 a boom company was formed, the experiment made in the spring proving conclusively that the project was a feasible one. The new boom was immediately commenced, and during the winter of 1849–50 it was made ready for receiving and holding the logs put into the river the following spring. At the end of four years it was manifest that the facilities for receiving and holding logs must be increased, and the work of extending the boom continued from time to time, until now it is a work of vast magnitude and strength, extending for miles up the river. The great piers in position, the immense timbers securely bolted together which rest against them to hold the logs, and the erection of the dam, show that the undertaking was a colossal one. The boom has a capacity for holding over 300,000,000 feet of lumber, and in the spring months, when it is packed full of logs so solidly that one can walk across the river on them, it is worth a journey of hundreds of miles to see. It requires a large amount of money to operate the boom every season.

POST 58, G. A. R.

PETROLEUM IN PENNSYLVANIA.

The history of petroleum, in the production of which Pennsylvania has almost a monopoly, has frequently but often disjointedly been written. We need not repeat all of this history, much of which relates to foreign countries, nor even refer in great detail to that part of it which relates to our own State. But the vast addition to the wealth of Pennsylvania which has been created by the development of petroleum within its boundaries would be but imperfectly comprehended if we did not call attention to the recent date of that development, and to the apparently permanent supply, as indicated by statistics, of the product itself.

In a paper on petroleum, published in August, 1876, in *Stowell's Petroleum Reporter*, the following statement is made:

> The earliest mention of the existence of petroleum in the United States is probably that contained in a letter of July 18, 1627, written by the French missionary, Joseph Delaroche, and published in Sagard's *Histoire du Canada.* The locality mentioned is supposed to be near the present town of Cuba, Allegheny county, New York. On a map published about 1760 there appears near the site of this town the words "*Fontaine de Bitume.*" The earliest mention of petroleum in the State of Pennsylvania appears to be by Charlevoix in his Journal of May, 1721, who speaks, on the authority of Captain de Joncaire, of the existence of a fountain, at the head of a branch of the Ohio (Allegheny), "the water of which is like oil and has the taste of iron," and was used "to appease all manner of pain." This is nearly 30 years previous to the supposed date of the celebrated letter from the commandant of Fort Duquesne (Pittsburgh) to General Montcalm. It is also interesting to note that on a map published in 1755 the word "petroleum" appears near the mouth of the present Oil creek on the Allegheny river.
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> From this time mention of the "Seneca oil," "naphtha," or "rock oil," as it was indifferently called, becomes more frequent. In 1843 the means of collection seem to have been by absorbing it with blankets from the surface of streams, or pools and pits dug for the purpose, on the banks of Oil creek. Two to ten or twelve barrels a year was the amount collected by each proprietor. Regarding price at this time (1843), the account says: "Forty or fifty years ago it was sold at sixteen dollars a gallon, but its present price (1843) in Pittsburgh is from seventy-five cents to a dollar." Though some little use was made of the oil in a crude state as an illuminator, its chief use was as a drug, mainly as a liniment.

In Professor S. F. Peckham's paper on petroleum in *Appleton's Cyclopædia* (1873) the following statement is made:

The occurrence of petroleum about the head waters of the Allegheny river in New York and Pennsylvania was known to the early settlers. The Indians collected it on the shores of Seneca lake, and it was sold as a medicine by the name of Seneca or Genesee oil. A stream in Allegheny county, New York, was named Oil creek in consequence of the appearance of oil in its banks; and the same name was given to another branch of the Allegheny river in Venango county, Pa. At points along the latter, springs issued from the banks of the stream, bringing up oil, which collected on the surface of the water as it stood in the pools below the springs. The inhabitants were accustomed to collect the oil by spreading woolen cloths upon the water, and wringing them when saturated. Down the valley of this creek are numerous ancient pits which appear to have been excavated for collecting oil, but by whom no one can now tell.

The quantities of oil collected by the early settlers were unimportant, the largest amount, which was from the lower spring on Oil creek, reaching sometimes 20 barrels in a year. When, in boring for salt near Tarentum, 35 miles [?] above Pittsburgh on the Allegheny river, springs of petroleum were struck in 1845, the material was valued only as a medicine, and for this use it was long retailed in small quantities at high prices. In Ohio, on the Little Muskingum, the inhabitants narrowly missed learning the importance of this product as far back as the year 1819. Dr. S. P. Hildreth, of Marietta, in the *American Journal of Science* (1826), speaking of the borings for salt water, says: "They have sunk two wells, which are now more than 400 feet in depth; one of them affords a very strong and pure water, but not in great quantity. The other discharges such vast quantities of petroleum, or, as it is vulgarly called, 'Seneka oil,' and besides is subject to such tremendous explosions of gas as to force out all the water and afford nothing but gas for several days, that they make but little or no salt. Nevertheless, the petroleum affords considerable profit, and is beginning to be in demand for lamps in workshops and manufactories. It affords a clear, brisk light, when burnt in this way, and will be a valuable article for lighting the street lamps in the future cities of Ohio." It is not a little singular that, with the sources of supply thus pointed out, and the useful application of the petroleum understood, its value should have remained unappreciated, and at the expiration of more than 35 years be at last perceived through the progress of experiments made upon the distillation of bituminous shales and coal.

In Professor C. F. Chandler's paper on petroleum in *Johnson's Cyclopædia* (1876) it is stated that "in 1829 a flowing oil well was accidentally obtained at Burkesville, Kentucky, and for two or three weeks the oil flowed over the surface of Cumberland river, and, becoming ignited, caused some apprehension of a general conflagration among the inhabitants of the towns and villages lower down on the river. As early as 1836 from 50 to 100 barrels of petroleum were collected annually in the valley of the Kanawha and sold as a medicine. It was not, however, till oil from coal and shale had been successfully introduced, with lamps specially adapted for this class of oils, that attention was directed to the petroleum springs as likely to furnish a cheap supply of material."

Hon. William E. Stevenson, of Parkersburg, West Virginia, calls attention to the fact that, as far back as 1771, Thomas Jefferson gave an interesting description of a burning spring and the oil connected with it, found in the Great Kanawha valley.

In the *Gazetteer of Pennsylvania*, (1832,) the author, Thomas F.

Gordon, speaking of Venango county, says: "Salt and nitre are found in various parts of the county, and coal in many places. On Oil creek are several springs of the species of bitumen known as Seneca oil." In his notice of Crawford county the same author says: "Salt licks and salt springs are seen in the northwest, and indications of coal in the south; a bituminous oil issues from several sources on Oil creek, known in commerce as Seneca oil; it colors the waters and emits a strong odor, even at the mouth of the creek. The oil is burned in lamps, and used in various ways, but is particularly valued for its bituminous qualities. The inhabitants make excavations in the low and marshy grounds, which are immediately filled with water covered with oil, which they skim off. Considerable quantities are annually sent to the Eastern markets."

This record is for 1832. In his *Historical Collections of Pennsylvania*, (1843,) Sherman Day narrates one of the "natural curiosities" of Venango county as follows:

> There are several natural curiosities in the county, the most remarkable of which is the peculiarly inflammable oil found floating on the surface of Oil creek. The following interesting extract from one of several historical numbers which appeared in the Franklin *Democr. Arch.* in 1842, relates to this subject: "The Seneca oil from the oil springs on Oil creek was used by the Seneca Indians as an unguent, and in their religious worship. It is almost as celebrated as the far-famed naphtha of the Caspian sea. With it the Senecas mixed their war-paint, which gave them a hideous glistening appearance, and added great permanency to the paint. The other use made of the oil was for religious worship. Here I cannot better describe it than in the imaginative language of the commandant of Fort Duquesne to his Excellency, General Montcalm, the unfortunate hero of Quebec. 'I would desire,' says the commandant, 'to assure your excellency that this is a most delightful land. Some of the most astonishing natural wonders have been discovered by our people. While descending the Allegheny fifteen leagues below the mouth of the Conewango, and three above Fort Venango, we were invited by the chief of the Senecas to attend a religious ceremony of his tribe. We landed and drew up our canoes on a point where a small stream entered the river. The tribe appeared unusually solemn. We marched up the stream about half a league, where the company, a large band it appeared, had arrived some days before us. Gigantic hills begirt us on every side. The scene was really sublime. The great chief then recited the conquests and heroism of their ancestors. The surface of the stream was covered with a thick scum, which burst into a complete conflagration. The oil had been gathered and lighted with a torch. At the sight of the flames the Indians gave forth a triumphant shout that made the hills and valleys re-echo again!' Here then is revived the ancient fire-worship of the East; here then are the 'Children of the Sun.'"

In his notice of Crawford county the same author refers to one of the "natural curiosities" existing on the borders of Oil creek in that county, as follows, the account being taken from the New York *Journal of Commerce* for 1830: "Springs exist on its margin, from which there is a constant flow of oil, floating on the surface of the water and running into the creek, which may be seen for a great distance down the stream. The oil is burned in lamps, and used in various ways, but is particularly valued for its medicinal qualities.

The inhabitants make excavations in the low and marshy ground, which are immediately filled with water, covered with oil, which they skim off. Considerable quantities are annually brought to this city and sold to the apothecaries." The Seneca Indians held sway over this region.

Rev. David Zeisberger, the Moravian apostle to the Indians, in his journal, written in 1769, makes the following mention of oil in Forest county, Pennsylvania.

> I have seen three kinds of oil springs, such as have an outlet, such as have none, and such as rise from the bottom of the creeks. From the first water and oil flow out together, in the second it gathers on the surface a finger's depth, and from the third it rises to the surface and flows with the current of the creek. The Indians prefer wells without an outlet. It is used, medicinally, for tooth-ache, rheumatism, etc. Sometimes it is taken internally. It is of a brown color, and burns well, and can be used in lamps.

In the special geological report of Henry E. Wrigley, C. E., on petroleum, (1875,) forming a part of the general report of the Second Geological Survey of Pennsylvania, the following statements are made concerning the early history of petroleum in Pennsylvania:

> The earliest mention of petroleum in the State of Pennsylvania seems to have occurred in the report of the commander of Fort Duquesne to General Montcalm, in the year 1750, he having witnessed a ceremony of the Seneca Indians on Oil creek, a prominent feature of which was a fire made from the oil which had oozed to the surface of the ground. Subsequently, along the entire range, from New York to Tennessee, in which petroleum has since been found, the earliest settlers, as well as the Indians, have not only found oil springs, or surface exudations of oil, but seem to have developed them in a crude way on account of the medicinal properties of the oil.
>
> We find along Oil creek, particularly between Titusvlile and Oil City, the circular, square and oval walled pits, from fifteen to twenty feet deep, cribbed with timber, which are so often referred to as being the work of a race of people who occupied the country prior to the advent of the Indian tribes. From the number of these pits and their systematic arrangement, petroleum was doubtless obtained in considerable quantities. For many years the entire supply of "naphtha," as it was commonly called, was obtained from the surface of these oil springs; sometimes by the use of a blanket or woolen cloth, which, when spread upon the surface, absorbed the surface oil, which was readily wrung out, and sometimes by the use of a few rude trenches, which conveyed the water and oil into a common basin, from which they were pumped into broad, shallow troughs, shelving off to the ground; where the water passed from each trough into the next a small skimmer was adjusted just under the surface of the water, so as to collect the oil and throw it off to one side. As late as the year 1859 all the oil known as Seneca oil or naphtha was obtained in this way; small quantities were kept by chemists, and as a drug it was considered valuable for rheumatism, flesh wounds, and similar ailments. The precursor of the discovery of petroleum was that of salt; the woodsman found that the deer frequented certain springs, and that they were salt springs or deer-licks, so that he built his blinds and coverts in the trees overhead and in the brush around, with loop-holes for his gun, and shot his game at leisure.
>
> Gradually, from increased demand, the salt became valuable and the deer extinct. Pits were dug, and finally artesian wells were bored, many years before such wells were drilled for oil.

These details, somewhat repetitious as a portion of them are, are given in full because they constitute the essential part of the early literature of petroleum in this country. Its existence in New York was known in 1627; in Pennsylvania as early as 1721; in the Kanawha valley in Virginia as early as 1771; in Ohio in 1819, and in Kentucky in 1829. But it did not become a commercial product worthy of attention until 1859, in which year the first oil well in the country was sunk on Oil creek in Pennsylvania. A brief narrative of this important event is subjoined.

Professor Peckham says that the success attending the experiments that had been made to extract oil from bituminous shales and coal, and the similarity of the oil thus obtained to the natural petroleum, caused attention to be directed to the sources of the latter, with the view of testing the capacity of the supply, and applying to the natural oil the methods of purification invented for the artificial. The paper in the *Petroleum Reporter* awards to Samuel M. Kier, of Pittsburgh, the honor of having first practically demonstrated the practicability of refining petroleum. This was done by him in 1850. He had previously collected petroleum from the salt wells near Tarentum, on the Allegheny river, twenty miles east of Pittsburgh, and bottled it as a medicine. In the year named he erected a small refinery in Pittsburgh and commenced to refine petroleum. His success was complete, and was only bounded by the small quantity of petroleum he was able to obtain.

In 1854 Messrs. J. G. Eveleth and George H. Bissell, of New York City, leased from Messrs. Brewer, Watson & Co., of Titusville, one hundred acres of land on the northern border of Venango county, just below the village, on which was an oil spring of considerable size. They organized a company in New York to collect the oil from the surface of ditches with blankets and squeeze it into tubs. The company was called the Pennsylvania Rock Oil Company. This was found to be an expensive and unprofitable business. In 1855 Professor Benjamin Silliman, Jr., made an encouraging report to this company on the petroleum resources of Venango county. No progress was made in establishing the business upon a profitable basis until December, 1857, when Messrs. Bowditch and Drake, of New Haven, undertook to search for oil—the latter gentleman, Colonel E. L. Drake, removing to Titusville. In 1858 Colonel Drake, the superintendent of the company before mentioned, made arrangements to sink an artesian well in the hope of finding oil, much to the amusement, it is said, of his neighbors. In the winter of 1858–9 the arrangements referred to were completed, the scheme embracing the boring into the rock below the bed of Oil creek. The work of "boring for oil" advanced but slowly, and it was not until August 26, 1859, that oil was "struck" at the depth of about 70 feet. A circumstantial account of the enterprise of Colonel Drake and its successful fruition is given in the paper in *Stowell's Reporter*, from which we have already quoted. It is as follows:

> About the middle of June, 1859, Col. E. L. Drake, of New Haven, Conn., after having been baffled and worried for months, began, at Titusville, Pa., the well that was to be the first of many thousands, although he was not at once successful, being troubled by the caving in and filling with water of the well, sunk to the rock, where drilling was to commence. In his trouble, Col. Drake invented the method of driving a pipe to the rock, which at once remedied the difficulty, and about the middle of August the drill was started, the depth made averaging three feet per day. On the afternoon of Saturday, August 29, 1859, the drill dropped into a crevice, a distance of about six inches, at a total depth of sixty-nine and a half feet. The drill was withdrawn and work ceased for the day. On the next day a tin rain-spout, plugged and let down into the well by a string and withdrawn, was found to be filled with petroleum. On Drake's arrival at the well next morning he found the old driller and his sons proudly guarding the spot with several barrels of petroleum standing about. The pump was at once adjusted; the well yielded about twenty-five barrels a day, and on the 31st of August, 1859, began the production of petroleum in a commercial sense. The news spread like wild-fire, and crowds came to view the wonderful well. While others were looking, Mr. Watson, a partner of Mr. Bissell, mentioned above, jumped on his horse and rode to secure the lease of a spring on the McClintock farm, near the mouth of the creek. Mr. Bissell, who was in New Haven, Conn., was informed by telegraph of the "strike," and in four days was in the oil regions leasing farm after farm on the creek and the Allegheny. The second well was sunk by Barnsdale, Meade & Rouse, and at the depth of eighty feet struck oil, in November, 1859, but the entire yield was only five barrels, till it was sunk to 160 feet, and in February, 1860, produced by pumping forty to fifty barrels a day.

The writer of the paper from which we have just quoted says that it was the vignette on the show bills of Kier's petroleum that gave Mr. Bissell the idea that the land of his company must be developed by artesian wells He also says that it was upon Mr. Kier's recommendation that Mr. Smith and his sons were engaged by Colonel Drake to drill the first well, and that the tools for the drilling were made in Mr. Kier's shop.

From Mr. Wrigley's report we gather the following details of the progress made in the development of the Pennsylvania "oil regions" after the successful wells above mentioned had been sunk.

> A second sand-rock was found underneath the first sand-rock of the Drake well, at a depth of about two hundred feet, which gave a greater yield; and in February, 1861, Mr. Funk found, upon the McElheny farm on Oil creek, a third sand-rock, and the first flowing well, at a depth of 400 feet. Soon afterwards the Phillips well, on the Tarr farm, Oil creek, at the same depth, flowed three thousand barrels per day; and soon after that the Empire well, in the vicinity of Mr. Funk's first well, also three thousand barrels per day. The consumption of oil at this time, as an illuminator, was, of course, not equal to this enormous supply, which was sold for the time at ten cents per barrel, and often given away or let run to waste. Production was paralyzed, and all small wells abandoned, and did not recuperate until 1864, when the total amount produced had declined to less than 4,000 barrels per day, and the demand, from the steadily increasing consumption, had made the highest market price yet known for crude, of fourteen dollars per bar-

rel maximum, and an average of over nine dollars for the year. This increased demand was met by the developments at Pithole, and the discovery that the oil sand-rock was not indicated by, nor confined to, the route of the water courses, but extended horizontally under the hills, and could be reached by the drill at a depth as much greater as the height of the hill required. Bennehoff, Pioneer, and Stevenson hills were thus developed in 1866; Tidioute and Triumph hills in 1867, and Pleasantville and Shamburg in 1868. Production and demand ran almost side by side for the next two years. Search, however, was being made with untiring diligence for new oil-producing spots.

We extract from Professor Chandler's paper the following graphic account of some of the effects which followed the sinking of the first oil wells in Pennsylvania.

> No mining enterprise had ever offered such sudden fortunes. A well costing a few thousand dollars might yield, if successful, from 100 to 2,000 barrels of oil daily, with no expense for pumping. The Noble well yielded, in a little more than one year, 500,000 barrels of oil. The Sherman flowed 450,000 barrels in about two years. The poor farmers on Oil creek, who could not previously have realized more than a few dollars per acre, suddenly found themselves wealthy. Single farms brought their owners from $500,000 to $1,000,000, with, in some cases, a royalty on the wells in addition. One man received $3,000 per day royalty from the wells on his farm, and thus accumulated $600,000, all of which was soon squandered. After a time, however, the novelty of the oil wells wore off somewhat, and a steady, permanent industry was established.

We need not further follow the development of the oil resources of Pennsylvania, except to say that in 1871 Mr. C. D. Angell, of Franklin, Pennsylvania, announced his theory of oil belts, which has led to a great increase in the production of petroleum in this State. The success attending the application of this theory seems to leave no room for doubt that the supply of petroleum in Pennsylvania is practically without limit.

The following statistics of the production of petroleum in Pennsylvania from the sinking of the Drake well to the present time are obtained from *Stowell's Reporter*.

Years.	Barrels, of 42 gallons.	Years.	Barrels, of 42 gallons.	Years.	Barrels, of 42 gallons.
1859	2,000	1866	3,597,700	1873	9,890,964
1860	500,000	1867	3,347,300	1874	10,950,730
1861	2,113,609	1868	3,646,117	1875	8,787,506
1862	3,056,690	1869	4,215,000	1876	8,968,906
1863	2,611,309	1870	5,260,745		
1864	2,116,109	1871	5,205,341	Total....	82,706,729
1865	2,497,700	1872	5,939,003		

Petroleum was produced in 1876 in the following counties of Pennsylvania: McKean, Warren, Crawford, Venango, Clarion, Armstrong, Butler, Lawrence, and Beaver. In the following counties petroleum has been found, but little or none was produced in 1876: Forest, Elk, Allegheny, Washington, Greene, Jefferson, Erie, Westmoreland, and Fayette. In 1877 petroleum was found in one or two other counties. The refining of petroleum is a leading branch of business in Pittsburgh. In 1876 there were in the city and its vicinity fifty-eight refineries, employing a capital of $18,000,000.

Oil wells were bored in New York, West Virginia, Ohio, and in other States after the success of the Drake well on Oil creek had been established. Great expectations were excited by the discovery of petroleum in California, but it was found that its quality was not of sufficient excellence to justify the investment of capital in its production. Petroleum has been found to exist in Canada in small quantities. In 1844 Mr. Murray described the petroleum of Enniskillen in Canada. As statistics show, Pennsylvania produces almost all the petroleum of the world. It has been estimated that 20,000 oil wells have thus far been dug in Pennsylvania and West Virginia, at an aggregate cost of $192,000,000. They have yielded about 88,000,000 barrels of oil, valued at the wells at over $300,000,000, or over $400,000,000 at the seaboard.

Mr. Stevenson, from whom we have already quoted, claims that to West Virginia belongs the honor of first furnishing the means of transporting petroleum to market in the modes now recognized to be cheap, safe, and expeditious, by means of tubing lines and iron tank cars.

The following statistics of the production of petroleum in 1870 are taken from the census report for that year:

STATES.	No. of Establishments	Power of Engines	No. of hands Employ'd	Capital.	Wages.	Value of Mater'ls Used.	Gallons Produced.	Value of Product.
Kentucky....	1	20	2	$1,000	$75	$400	4,000	$650
Ohio..............	25	547	69	194 730	21,000	13,494	2,038,543	228,488
Penna...........	2,148	20 943	4,070	9,249,283	3,797,818	1,293,177	171,207,622	18,045 967
W. Virginia	140	1.972	347	600,813	176,137	94 874	8,013,340	1,029,119
Total...	2,314	23,482	4,488	$10,045,826	$3,995,030	$1,401,945	181,263,505	$19,304 224

The following statistics of the exports of crude and refined petroleum from the United States to all countries during the past eight years are taken from the Commerce and Navigation Reports of the United States Government:

Fiscal Years ending June 30.	CRUDE PETROLEUM.		REFINED PETROLEUM.	
	Gallons.	Value.	Gallons.	Value.
1870	9,955,066	$2,060,155	97,902,505	$29,864,193
1871	9,460,816	1,820,803	132,608,955	34,138,736
1872	13,559,768	2,307,111	122,539,575	30,566,108
1873	18,439,407	3,010,050	158,102,414	37,195,735
1874	17,776,419	2,099,696	217,220,504	37,560,955
1875	14,718,114	1,406,018	191,551,933	27,030,361
1876	20,520,397	2,220,268	204,814,673	28,755,638
1877	23,819,202	3,756,729	262,441,844	55,401,132

Natural gas has been obtained in large quantities from petroleum wells in Pennsylvania, New York, and Virginia, and extensively utilized in the production of light and as a fuel in the manufacture of iron and in other industrial enterprises. The gas is generally obtained from wells that have been bored for oil, although wells have been bored for gas alone. The first natural gas that has been utilized in this country was probably that found at Fredonia, New York, in 1821. The gas was found coming up in the bed of a creek at the village, and was then used, although in a small way, to light some houses. In 1858 a gas well was sunk on the creek, which has since yielded a steady supply of gas. Other wells have since been sunk at Fredonia and Buffalo. The city of Erie has been lighted with natural gas for many years, and in and around the city there are fifty gas wells, the gas from which is used as a substitute for coal in generating steam in various industrial establishments. A gas well in Allegheny township, Westmoreland county, on the south bank of the Kiskiminetas river, directly opposite the town of Leechburg, supplies the rolling-mill at Leechburg with sufficient gas to operate all its puddling and heating furnaces. At Pittsburgh the rolling-mill of Spang, Chalfant & Co. and the rolling-mill of Graff, Bennett & Co. are supplied with gas brought in pipes eighteen miles from gas wells in Butler county, which is used in puddling and heating iron. Many gas wells have been bored in Venango and other oil-producing counties, but very little of the gas obtained has thus far been utilized. Gas has also been found on Jacob's creek, an affluent of the Youghiogheny river. In some instances the pressure of the escaping gas indicates five hundred pounds to the square inch, and its roar can be heard for miles. It is the opinion of geologists that the oil sand-rocks furnish the principal supply of this natural gas.

OTHER LEADING PENNSYLVANIA INDUSTRIES.

LEATHER is one of the principal manufactured products of Pennsylvania—the agricultural predilections of its people, the abundant supply of bark suitable for tanning, the cheapness of coal for generating steam, and, later, the ease with which foreign supplies of hides may be obtained, furnishing all needed advantages for its manufacture. The business is at this day largely prosecuted in Philadelphia, Wayne, Luzerne, Monroe, Susquehanna, and Allegheny counties, while almost all the other counties in the State devote more or less attention to it. In 1870 the total product of tanned leather in the United States was valued at $86,169,883, Pennsylvania's production being valued at $19,828,323, or almost one-fourth of the whole amount. New York was in that year the first in the list of leather-manufacturing States, its product being valued at $26,988,320. Pennsylvania ranked next to New York. Massachusetts followed Pennsylvania, its product amounting to $9,984,497. No other State produced leather one-half in value the product of Massachusetts. The following statistics of the production of tanned leather in the United States and in Pennsylvania in 1870 are taken from the census report:

Political Divisions.	Number of Establishments.	Hands Employed.	Capital.	Wages.	Materials.	Products.
United States...	4,237	20,784	$42,720,505	$7,934,416	$63,069,491	$86,169,883
Pennsylvania...	890	4,650	11,800,046	1,683,479	13,994,036	19,828,323

The rapid increase during late years in the exports of leather and its manufactures from the United States to foreign countries is a source of gratification to every patriotic American, and in this increase Pennsylvania liberally shares. The official figures of all exports for the past eight years are as follows:

Leather, and Manufactures of.	Fiscal Years, ending June 30th,							
	1870	1871.	1872	1873.	1874	1875.	1876.	1877.
Boots and Shoes	$419 612	$445,466	$502,689	$421,548	$383,417	$429,363	$368,633	$414,630
Leather of all kinds not specified..............	106,312	480,543	2,864,800	4,365,174	3,940,450	6,286,397	8,394,580	6,016,373
Morocco, and other fine..........	4,765	18,690	153,962	247,711	232,884	335,086	948,980	1,280,225
Saddlery and harness..	55,379	798,182	65,599	101,943	98,132	74,102	87,730	94,085
Manufactures of, not specified....................	87,263	154,514	96,979	169,118	131,635	199,848	209,062	361,988
Total......	$673,331	$1,897,395	$3,684,029	$5,305,494	$4,786,518	$7,324,796	$10,008,985	$8,167,301

Glass has been made in Pennsylvania from a very early period in its history. The first glassworks within the borders of the State were established under the auspices of William Penn and the Free Society of Traders in 1683, the year after Philadelphia was founded. This enterprise seems to have been unsuccessful. Soon afterwards a glasshouse and pottery were established by some English Friends at "Frankfort," near Philadelphia. Other glassworks were established in the State before the Revolution, notably the works of Baron William Henry Steigel at Manheim, in Lancaster county, which were most extensive, but do not seem to have been very productive of either glass or profits. They were in operation in 1770. There was a "glass facture" on Market street, Philadelphia, in 1772, "where the highest price is given for broken flint glass and alkaline salts." The first glassworks at Pittsburgh, the centre of the glass manufacture in the United States, are thus described by Dr. J. L. Bishop in his *History of American Manufactures*, from which the above facts have been gathered:

> The first glass factory in Pittsburgh, which has since acquired so much eminence in the manufacture, was not commenced until about the year 1795. In January, 1784, the first sale of lots was made on the present site of the city by the Proprietaries of the Manor, John Penn, Jr., and John Penn, to Isaac Craig and Stephen Bayard. The laying out of the town was finished in June. In 1795 a small window-glass manufactory had been set up and was in operation, having one eight-pot furnace. It was situated on the west side of the Monongahela, at "Scott's," now called Glasshouse Ripple. Wood fuel was employed, and three boxes were made at a blowing. But Pittsburgh is chiefly indebted for this valuable branch of its industry to the enterprise and perseverance of General James O'Hara, who with Mr. Craig made preparations the following year for the manufacture, and employed Mr. Peter Wm. Eichbaum, of Philadelphia, to erect the works. The first furnace, of the same capacity as the one above mentioned, was below Jones's Ferry, nearly opposite the Point, where other glasshouses now stand. Green glass was made at this factory, which went into operation in 1797. A memorandum was found among General O'Hara's papers, after his death, to this effect; To-day we made the first bottle, at the cost of thirty thousand dollars." Flint-glass and window-glass were soon after added to the manufactures, and the proprietor and others were induced by his example to engage in the business, which soon became a principal industry in that place. The abundance of coal, which was mined at the very doors of the furnaces, gave it unequaled advantages, which were increased by the facilities for obtaining other materials by water, either from above or below the town.

It has been claimed that Albert Gallatin, one of the most eminent of Americans, who was a citizen of Fayette county, Pennsylvania, during forty years of his long and useful life, and whose memory is not sufficiently revered by the people of the State which he so highly honored, was the first person to establish glassworks in Western Pennsylvania. We can not find proof to establish the correctness of this claim. On the contrary, we find at least *prima facie* evidence that he did not make glass until after 1795, when it was first made at Pittsburgh. Those who prefer the claim that Mr. Gallatin made the first glass in Western Pennsylvania say that he had for partners in the business the Messrs. Kramer, who were Germans, and a Mr. Nicholson, who aided him in the establishment of a glass factory at New Geneva, in Fayette county, in 1787. Mr. Nicholson was doubtless a brother or other relative of Mr. Gallatin's second wife, who was a daughter of Commodore James Nicholson, and whom he married in 1793. Hon. James Veech, in his unpublished work entitled *The Monongahela of Old*, states that the company did not establish the glassworks until 1796, and this is probably, in view of the marriage to Miss Nicholson in 1793, the correct date of the New Geneva enterprise. If this conclusion be correct, Pittsburgh and not New Geneva made the first glass west of the Alleghenies.

About 1810 a wealthy Englishman named Lewis established extensive glassworks on the shore of a lake in Sullivan county called Eagle's Mere. The enterprise was not successful, the war of 1812 combining with other causes to bring it to an untimely end.

In 1816 glassworks were established near Bethany, then the county-seat of Wayne county. The projector was Christopher Faatz, a German, who organized a company to build and operate the works. Timber for fuel and sand of suitable quality were at hand—the latter on the shores of several beautiful lakes, but the company failed in a few years and the works passed into other hands. The business was revived, and glass continued to be made here down to 1848. In 1847 glassworks were established at Tracyville in the same county, and subsequently extensive flint-glass works were established at White Mills, five miles from Honesdale, also in Wayne county.

We need not further notice the early glassmaking enterprises in this State. To-day Pennsylvania is the leading State in the Union in the manufacture of glass, as it has long been. Of a total production of all kinds of glass in the United States in 1870, amounting to $14,508,429 in value, Pennsylvania produced more than one-half, or to the value of $7,515,415. Of this amount Allegheny county produced to the value of $5,832,492. The other counties in the State which produced glass in that year were Beaver, Centre, Fayette, Lawrence, Montgomery, Philadelphia, and Tioga. Within the last few years the exports of American glass have sensibly increased.

The manufacture of PAPER was one of the earliest industries that were established in Pennsylvania. The State in 1870 ranked third in the list of papermaking States. The total production of all kinds of paper in the United States in 1870 amounted to $50,842,445 in value. Of this amount the value of the product of Massachusetts was $12,696,491; of New York, $11,779,563; and of Pennsylvania, $6,511,446. Ohio came next, her product amounting to $4,010,483. This country has never exported much paper, the total exports in the fiscal year which ended June 30, 1877, amounting to only $938,218.

In the manufacture of BOOTS AND SHOES Pennsylvania in 1870 occupied the third place. Since that date this industry has very greatly developed within her borders, although her place in the list of States which make boots and shoes may not have been changed. In 1870 the whole country produced boots and shoes to the value of $181,644,090. Of this total the share of Massachusetts was enormous, being no less than $88,399,583; that of New York was $22,679,874; land that of Pennsylvania was $16,864,310. Illinois came next, with $4,443,794. To the total product of Pennsylvania the city and county of Philadelphia contributed $9,231,348. No other county was prominent in this industry. The exports of boots and shoes are given in the preceding table relating to leather and its products, by reference to which it will be seen that they are unimportant, amounting to less than half a million of dollars annualy.

Carpets form a leading branch of the industries of Pennsylvania, which ranks first in the list of carpet-making States. In 1870 the total product of the country was valued at $22,766,900, and of this amount Pennsylvania manufactured to the value of $10,218,621, or almost one-half of the whole. New York came next to Pennsylvania, with $5,226,835, and Massachusetts came next to New York, with $4,533,375. Of the total production of the State, Philadelphia city and county produced to the value of $9,798,019. Thus far the country has not established any export trade in carpets that is entitled to be dignified with the name, the total exports in the fiscal year 1876 amounting to only $6,586, and in the fiscal year 1877 to only $16,377.

Pennsylvania occupies a prominent position among her sister States in the manufacture of cotton and woolen goods. The total production of cotton goods in the United States in 1870 was valued at $177,489,739. Of this total Massachusetts produced to the value of $59,493,153; Rhode Island, $22,049,203; Pennsylvania, $17,490,080; New Hampshire, $16,999,672; Connecticut, $14,026,334; Maine, $11,844,181; New York, $11,178,211; Maryland $4,852,808; New Jersey, $4,015,768; Georgia, $3,648,973. No other State manufactured two million dollars' worth of cotton goods. The total production of woolen goods in the United States in 1870 was valued at $177,495,689. Of this total Massachusetts manufactured to the value of $47,783,083; Pennsylvania, $35,463,624; Connecticut, $17,962,048; Rhode Island, $15,394,067; New York, $14,632,186; New Hampshire, $10,213,526; Maine, $6,483,881. No other State manufactured five million dollars' worth of woolen goods in 1870. The above statistics show Pennsylvania to have occupied in 1870 the second place in the manufacture of woolen goods, and the third place in the manufacture of cotton goods. Being also first in the manufacture of carpets, as already shown, the position of the State as a manufacturer of textile fabrics is one of very high honor.

Nor was the position of Pennsylvania in the manufacture of silk in 1870 much inferior to that of any other State. In that year the total value of all silk manufactures in the United States was $12,210,662. Of this total Connecticut produced to the value of $3,314,845; Massachusetts, $1,402,500; New Hampshire, $25,000; New Jersey,

$3,998,964; New York, $1,826,073; Pennsylvania, $1,632,900; Vermont, $10,380: total, $12,210,662. In 1876 the total value of all the silk manufactures of the country was $26,593,103, but this amount was slightly exceeded in 1875, when it reached to $27,158,071.

Pennsylvania is a large manufacturer of MACHINERY and of STOVES AND CASTINGS. In 1870 the total manufacture of machinery in the United States was valued at $138,519,246, Pennsylvania ranking first in the list of States, contributed to the amount of $29,258,153. New York came next with $20,962,058, followed by Massachusetts with $16,426,742, and Ohio with $11,324,489. No other State produced ten million dollars' worth of machinery in that year. In 1870 the total value of all the stoves and castings manufactured in the United States was $99,843,218. Of this total the share of Pennsylvania was $18,758,295. It was, however, surpassed by New York, with $23,993,436. Ohio produced to the amount of $10,539,400, and Massachusetts to the amount of $7,046,702. No other State equaled Massachusetts in the manufacture of stoves and castings. In the exportation of machinery and stoves and castings this country has made considerable progress.

In the manufacture of FLOURING AND GRIST MILL PRODUCTS, which includes all the work done by flouring and grist mills, whether for individuals who have their own grain ground for their own use, or of flour, meal, etc., ground for market by the proprietors of mills, Pennsylvania in 1870 stood second in the list of States. The total production of these products in that year was valued at $444,985,143. Of this total, New York produced to the amount of $60,237,220; Pennsylvania, $49,476,248; Illinois, $43,876,775; Missouri, $31,837,352; Ohio, $31,692,210; Indiana, $25,371,322; Michigan, $21,174,247; Wisconsin, $20,419,877; and Iowa, $15,635,345. No other State produced so much as Iowa. Since 1870 the young State of Minnesota, which in that year produced only to the value of $7,534,575, has probably doubled its annual production, and other Western States have increased theirs, but the position of Pennsylvania in 1876 was in all probability the same that it held in the census year.

In the manufacture of FURNITURE AND WOODENWARE of all kinds Pennsylvania in 1870 was the third State. The total production of these articles in that year by the whole country was valued at $80,852,438, of which total the share of Pennsylvania was $10,099,422. New York was the first State, almost doubling the product of Pennsylvania, and Massachusetts was the second State, contributing about one-fourth more than Pennsylvania.

We give on the following page a tabular statement showing the relation of several of the leading manufacturing industries of Pennsylvania to the same industries in the country at large in 1870, together with a summary statement of the total manufactures and other products of Pennsylvania compared with the total manufactures and other products of the United States in that year.

GENERAL SUMMARY OF MANUFACTURING STATISTICS FOR THE UNITED STATES AND FOR PENNSYLVANIA FOR THE YEAR 1870.

PRODUCTS.	CAPITAL INVESTED.		WAGES PAID.		VALUE OF PRODUCT.	
	U. S.	Penn'a.	U. S.	Penn'a.	U. S.	Penn'a.
Agricultural implements.	$34,834,600	$3,387,949	$12,151,504	$1,025 618	$52,066.875	$3,652,295
Boots and shoes	48,994,366	6,375 943	51,972,712	4,818,902	181,644,090	16,864,310
Brick.	20,504,238	4,559,783	10,768,853	2,337,691	29,028,359	6,071,209
Bridge building	2,973,250	275,500	1,123,353	240,500	5,476,175	948,256
Carpets, all kinds	12,851,494	5,195,474	4,822,866	1,933,582	22,766.900	10,218,621
Carriages and wagons	37,309,723	4,400,617	21,680,057	2,263,843	66,795,670	6,783,309
Cars	16,632,792	3,763,804	9,659,992	2,193,857	31,070,734	9,288,041
Clothing	53,743,598	10,378,443	33,260,535	5,040,272	161,560,836	23,363,156
Coal-oil, rectified	6.770,383	4,006,433	1,184,559	638.583	26,942,287	12,251,223
Cotton goods	140,706,291	12,550,720	39,044,132	3,496,986	177,489,739	17,490,080
Edge tools and files	10,066,122	1,657,280	4,768,535	628,627	12,754,734	1,806,033
Flour-mill products	151,565,376	20,393,620	14,577,533	1,278,146	444,985,143	49,476,245
Furniture	43,947,913	5,005,053	21,574,531	2,430,868	69,688 684	8,082,530
Glass	14,111,642	6,471,416	7,846,425	3,544,570	19,235,862	8,422,605
Hardware	15,351,540	1,120,920	7,907.699	490,312	25,464 452	1,777 285
Hats and caps	6,489,571	1,035.663	6,574,490	703,088	24,848,167	2,813,766
Hosiery	10,931,260	2.979,000	4,429.085	1,280,270	18,411,564	5,306,738
Iron	139,869,067	66.569,679	48,153,234	20,833,450	247.109,476	110,630,760
Jewelry	11,867,856	956,600	4,498,343	414,677	22,321,029	1,764,731
Leather (all kinds)	61.124,812	15,317,785	14,505,775	2,587,699	157,237 597	28,899.496
Liquors	66,658,945	9,571.253	9,009,062	993,354	94,123 014	11,692.528
Lumber	161,500,273	27,802,710	46,231,238	6,226.393	252,339,029	35.262,590
Machinery	101,183,597	26,068 155	47,866,882	9,944,130	138,519,246	29.258,153
Paints.	11,156,400	3,048 250	1,567,037	362,396	16,932,405	4,624.779
Paper	34,365,014	4,814 040	7,148,513	749,138	48,676,935	5,626,946
Paper-hangings	1,415,500	933,000	329,267	129,540	2,165,510	884,500
Salt	6,561,615	171,700	1,147,910	57,980	4,890.629	187,312
Saws	2,883,391	930,500	995,609	460,479	3.175,289	1,235,184
Scales	1,019,500	114,000	668,451	44,040	2,823,816	139,642
Sewing machines	8,759,431	721,500	5,142,248	201,300	14,097,446	685,500
Ship materials	9,102,335	1,556,492	5,594,686	1,065,265	17,910,328	3,083,244
Shovels	757,100	376,000	489,100	108.100	2,445 526	585,000
Silk goods.	6,243,130	1,429,000	1,953,306	326,400	12.739,362	1,632,900
Steel (inc. Bess.)	8,771,900	5,671,400	2,252,838	1,540.068	12,538,979	7,343,701
Stone and earthen ware	5,294,398	1,477,240	2,247,173	448.315	6,045,536	1.659,747
Stoves and castings	67,578 961	14,872,073	28,845 914	4,952,788	99,843,218	18,758.295
Sugar, refined cane	20,545,220	5 619,000	3,177,288	663,408	108.941,911	26,731,016
Tobacco and cigars	24,9 4,330	2,517,795	14,315,342	1,591,789	71.762,044	6.234,493
Wood manufactures	7,070,906	1,183.973	3,462,102	538,720	11,763,754	2,016.892
Wool manufactures	108,910,309	17,588,913	31,246,432	5,736,962	177,495,689	35,463,624
All other manufactures	622,920,620	105,953,199	241,399,732	33,660,488	1,336,797,403	192,877,669
Total	$2,118,208,769	$406,821,845	$775,584,343	$127,976,594	$4,232,325,442	$711,894,344
SPECIAL INDUSTRIES UNENUMERATED ABOVE.						
Agricultural products	$9,599,682.299	$1,079,139,778	$310.286,285	$23,181,944	$2,447,538 658	$183,946.027
Coal, anthracite	51,016,785	50,936.785	23,015,813	22,982,813	38.495,745	38,436.745
Coal, bituminous	58,991.244	16,974,918	21,300,678	8,995,495	35.020 247	13,921,069
Copper, mined	7,789,371	30,500	2,706,264	2,640	5,201,312	7,800
Fisheries (ex. whale)	7,469,575	24.048	3,449,331	14,112	11,096,522	38,114
Iron ore	17,773,935	4,548,026	6,838,022	2,051,345	13,204,138	3,944,146
Marble	1,316,600	226,000	442,270	39,320	804.300	101,000
Nickel ore	60,000	60,000	6,400	6,400	24,000	24,000
Slate	2,738,239	1,502,339	815,731	325,447	1,311.492	618,229
Zinc ore	2,414,942	400,000	250,075	167,721	788,880	235,555
Total	$9,749,252,984	$1,153,842,394	$369,110,869	$57,767,237	$2,553,485,294	$241,272,685
Petroleum	$10,045,826	$9,249,283	$3,995,030	$3,797,818	Gallons. 181,263,505	Gallons. 171,207,622

NOTE.—The capital invested in agriculture above given includes the value of farming implements as well as the value of the farms and stock; and the wages paid includes the estimated value of the board of farm hands.

A DECAYING INDUSTRY.

There is one of the industries of Pennsylvania which may be said to be in its decadence. The manufacture of salt was at one time a prominent and promising industry of the State, but its prominence has departed, and it exhibits no sign of ever being infused with new life. The industry has always been virtually limited to a small section of the western part of the State, mainly embraced in the Conemaugh valley. It was firmly established early in the present century, long before either canals or railroads were built in the State. It was one of our pioneer industries, and in its palmy days it was a great convenience and a source of profit to the inhabitants of the western counties. It was energetically prosecuted for more than a quarter of a century, and it is to be regretted that it should ever have been suffered to decline. The following extract from the introduction to the census report on manufactures for 1860 gives some information concerning the beginning of the salt industry in Pennsylvania:

> A company of Philadelphia and Pittsburgh merchants are said to have erected saltworks on the Big Beaver creek in 1784. In 1810 one saltwork in Indiana county was reported as having made 600 bushels of salt, worth $1,000. About that time William Johnson commenced boring on the Conemaugh river, near the mouth of the Loyalhanna, and struck an abundant fountain of salt water at the depth of 450 feet, and erected furnaces, pans, etc., by which he made about 30 bushels per diem, which he sold at a high price. Other wells were soon sunk at a depth of 300 to 600 feet in the coal measures of that region, and the price of salt was reduced as low as $1 per barrel, but afterwards fixed at $2, which afforded a profit. The pumps were first worked by horse-power, and afterwards by small engines. In 1820 the business employed a capital of $33,000 in Western Pennsylvania, and in 1826 there were 35 saltworks on the Conemaugh and Kiskiminetas, 3 upon the Allegheny, and others in progress elsewhere, one of which was expected to yield 1,500 bushels daily. Salt was supplied at the works for 20 to 25 cents a bushel, while it brought 50 cents in Kentucky, Ohio, and Illinois.

In Egle's *History of Pennsylvania* the following additional details are given of the beginning of the salt industry in the Conemaugh valley. A slight discrepancy in the date of the pioneer enterprise of Mr. Johnston and in the depth of his well will be observed in this statement when compared with that above given.

> About the year 1812 or 1813 an old lady named Deemer discovered an oozing of salt water at low-water mark on the Indiana side of the Conemaugh river, about two miles above the present site of Saltsburg. Prompted by curiosity she gathered some of the water to use for cooking purposes, and with a portion of it made mush, which she found to be quite palatable. This discovery very shortly led to the development of one of the most important business interests in Indiana county. About the year 1813 William Johnston, an enterprising young man from Franklin county, commenced boring a well at the spot where Mrs. Deemer made the discovery, and at the depth of two hundred and eighty-seven feet found an abundance of salt water. The boring was done by tramp or treadle, the poles being connected with open mortice and tongue, fastened with little bolts. The salt was manufactured by boiling the water in large kettles, or graimes, using wood for fuel, until, with the opening of additional wells, some fifty or sixty acres of woodland had been consumed for this purpose. Originally, the pumping was done by blind horses, and the salt sold at five dollars per bushel retail, but as the wells multiplied the price came down to four dollars. With the increase of the trade came new machinery and appliances in the manufacture of the salt. The unwieldy kettles were dispensed with, and large pans of half-inch iron, some twenty feet long, ten to eleven feet wide, and eight inches deep, were used instead; coal was used as fuel, and the blind horses were put aside, and the steam engine introduced for both boring and pumping. The place was called the Great Conemaugh saltworks, from the name of the river upon which they were located, and a post-office with that name was established there. The seven wells along the river on the Westmoreland side were all put down prior to 1820 and 1822; and from that date till 1830 the group of hills on both sides of the river was like a great beehive; yet the expenses of production in many cases exceeded the income. The coal and machinery had to be hauled from Pittsburgh by wagon, or brought by the river in keel-boats—both expensive means of transportation.

In the sketch from which the above extract is taken, twenty-one saltworks, embracing twenty-four wells, are enumerated as having once been in operation on the Conemaugh river, in Westmoreland and Indiana counties, all of which works, except three, had been abandoned in 1876. These three were, "the Hillery, owned by Harry White, and leased to Johnson, Boyle & Son; the Waddle group, owned and run by Samuel Waddle; and the Wineings, owned by Wineings."

In 1811 saltworks were erected on Sinnemahoning creek, probably in the present county of Cameron, in which county saltworks are designated in a late map. These works were erected by a company, and a handbill then printed announced that "considerable quantities of salt have been already manufactured."

Fuller details than are given above of the production of salt in 1820 are found in the census report for that year. Fragmentary as they are, they are nevertheless interesting. Armstrong county—capital invested, $6,000; 38 pans; value of product, $18,000. Erie county—capital, $1,500; 18 kettles, of 32 gallons each. Indiana county—capital, $12,000; 32 pans and 192 kettles: price of salt, $1 per bushel. Westmoreland county—capital, $13,500; six establishments, making about 70,000 bushels of salt; price, $1 per bushel. The manufacture of salt was the only industry reported for Indiana county in the census of 1820.

In 1832 Gordon, in his *Gazetteer of Pennsylvania*, gave the production of salt in Pennsylvania in 1830 at 100,000 barrels of five bushels each, the value of which, at $2 a barrel, amounted to $200,000.

In 1840 Pennsylvania produced 549,478 bushels of salt in the following counties: Allegheny, 36,875 bushels; Armstrong, 322,030; Beaver, 1,440; Butler, 15; Fayette, 155; Indiana, 70,890; McKean, 1,000; Westmoreland, 117,073: total, 549,478 bushels. Capital invested, $191,435. Value of product and number of establishments not given.

The statistics of the Pennsylvania salt manufacture in 1850, 1860, and 1870 are as follows: 1850—establishments, 47; bushels of salt produced, 910,100; value of product, $206,796. 1860—establishments, 34; bushels of salt, 1,011,800; value, $196,916. 1870—establishments, 27; bushels of salt, 579,970; value, $187,312. It thus appears that the business reached its culmination in 1860. The production of salt in 1870 was probably confined to five counties, although only four are enumerated in the census tables for that year, as follows: Allegheny—number of establishments, 9; value of product, $105,400. Indiana—establishments, 2; value of product, $12,750. Westmoreland—establishments, 4; value of product, $15,360. Armstrong—establishments, 8; value of product, $32,942. These items do not quite aggregate the total number of establishments and value of product quoted above from the statistics of manufactures for the State at large in the census report for 1870.

Salt has been found in Susquehanna, Tioga, and a few other counties than those above mentioned, but not in paying quantities.

Prior to 1796 all the salt used in Western Pennsylvania was packed or hauled from Eastern cities. In that year General James O'Hara, of Pittsburgh, opened communication with the Onondaga saltworks in New York, and he continued to supply Pittsburgh and Western Pennsylvania with salt down to the discovery of salt in the Conemaugh valley.

THE INDUSTRIAL RESOURCES OF PENNSYLVANIA.

In the manufacture of railroad cars, carriages and wagons, iron bridges, architectural ironwork, agricultural implements, hardware, hats and caps, paints, saws, edgetools and files, scales, sewing machines. chemicals, pottery, tobacco and cigars, and other manufactured products not specifically commented upon in the preceding pages, Pennsylvania has made more or less progress, but in most of these branches of industry there yet remains much for her to accomplish. She has not utilized all her advantages as a manufacturing State. Does any good reason exist, for instance, why she should send to Ohio and other Western States for a large number of the agricultural implements she needs? Does any good reason exist why the manufacture of iron products within her borders should be so generally restricted to the coarser forms of iron and steel? New England diversifies her iron manufactures, and finds her profit in this diversification. Pennsylvania might well manufacture more hardware and cutlery, and more finished iron products of all kinds, than she does. So, too, passing to the agriculture of Pennsylvania, we have yet to see any good reason assigned why the West should supply Philadelphia, Pittsburgh, and other leading markets of the State with the great bulk of the beef cattle and hogs they consume. The farmers of Pennsylvania could greatly add to the home supply of these food products if they would. The fertility of their farms would be increased and their own incomes would be increased if they would raise more stock than they do. There is no good reason why they should not. A State that produces all the grasses and cereals that grow in Pennsylvania only needs a little closer study of market quotations, and a little more enterprise by its farmers, to enable it more nearly to meet its own wants for fresh and cured meats. This deficiency in stock-growing is at once the greatest desideratum and the greatest weakness in Pennsylvania agriculture to-day. This want and this weakness are the more to be wondered at when the fact is considered that the quality of the stock grown in the State has always ranked very high, and is scarcely excelled anywhere in the world.

It is not an empty boast to say that Pennsylvania is undoubtedly the richest State in the Union in natural resources, both in extent and variety. The iron and other ores; the coal, petroleum, salt, building stone, slate, potter's earths, silicious sand, etc., found under ground; and the vast forests of pine and other timber; the fertile valleys and hillsides; the salubrious climate; the abundant and well distributed water-power, available for turning the wheels of saw and grist mills, woolen factories, paper mills, blast furnaces, forges, and other manufacturing establishments; the large streams which facilitate and cheapen transportation; the magnificent outlet to the ocean in the East through the Delaware river, and the outlets to the Great West and South through the Ohio river and Lake Erie, form a combination of natural advantages which no other State possesses. The utilization of these advantages, although that utilization falls short of possibilities that might be easily achieved, annually yields a larger revenue to the State than is derived by any other State from its natural resources, except New York. Pennsylvania produces almost one-half of all the iron manufactured in the Union; mines two-thirds of all the coal; builds nearly all the iron ships; ranks fourth among the States in agriculture; is the second State in general manufacturing activity, New York being the first when the last census was taken; is second only to Michigan in the production of lumber; is the second State in the production of leather; produces nearly all the petroleum that is obtained in the country; is the leading State in the manufacture of carpets, the second in the manufacture of woolen goods, and the third in the manufacture of cotton goods; is the leading State in the manufacture of machinery; is surpassed only by New York in the manufacture of stoves and castings; is the leading State in the manufacture of glass; is the third State in the manufacture of paper; holds the same rank in the manufacture of boots and shoes, and the same in the manufacture of furniture and woodenware; and is the second State in the manufacture of flouring and grist mill products. It has more miles of railroad than any other State except Illinois. It is not the first nor even the second State in foreign or internal commerce, but its position among the States as a common carrier and an exchanger of products is nevertheless very prominent. But neither foreign nor internal commerce is, strictly speaking, in these days of railroads and steamships, an outgrowth of the natural resources of a State. They are rather the result of commercial enterprise and fortuitous accidents than of natural advantages. Illinois has more miles of railroad than Pennsylvania, because the General Government greatly aided her to develop her railway system but gave to Pennsylvania nothing. Fire and life insurance companies flourish in Connecticut and bring great gain to her people, but, while such organizations undoubtedly show remarkable enterprise and thrift, it would obviously be a blunder to class them among the products derived from the natural resources of the State; they are a product of the moneychanger's art, which flourishes everywhere. New York City wrested from Philadelphia her leadership in foreign commerce mainly because New York State had the wisdom to build the Erie Canal years before Pennsylvania began her system of internal improvements. Much of the foreign commerce that has been lost to Philadelphia promises to return to her. But, counting foreign and internal commerce as the consequences of natural conditions, Pennsylvania is surpassed only by New York in the annual aggregate value of all her industries. The secret of her growth and prosperity in the past lies partly in the enterprise and courage of her people, but is mainly found in the diversity of her natural resources. From this cause her future must become brighter and brighter as the years roll on. Her place eventually as the unchallenged leader of all the States is secure. When once the tide of Western emigration is checked because prairie farms can no longer be bought with small savings; when the mania for deserting the farm and rushing to the town or city shall have been turned into a more healthy desire to till the soil, and thousands of new farms shall be opened in Pennsylvania in its wilderness places; and when many minor manufacturing industries that now do not exist in the State, or have only an imperfect development, shall have been planted and firmly established, as they are surely destined to be, then Pennsylvania will know no rival among all her sisters. Her present prosperity and future greatness rest upon an enduring foundation.

TRANSPORTATION IN PENNSYLVANIA.

Pennsylvania now contains more miles of railroad than any other State in the Union except Illinois. It surpasses Canada, Mexico, Central America, and the West Indies combined; exceeds all South America; excels Oceanica and Africa combined; falls very little below Asia; and of all the countries in Europe it is only exceeded in its railroad mileage by Germany, Great Britain, France, Austria, and Russia. In consequence of the extent of its railroads, dependence upon them is so complete that in considering the means of communication between different portions of the State reference is always made to some existing railroad connection, and its canals and turnpikes have become important to local interests only. The change from one kind of communication and transportation to another, however, should be noted in a review of the material progress of the State, and therefore a sketch of the various means of communication will be a fitting introduction to the history of the present rapid transit by rail.

Early Means of Intercourse.—The vicinity of the Delaware river was the first locality within the present limits of Pennsylvania in which settlements were made. The Dutch made an attempt to acquire this territory in 1623 when they built a fort upon the site of Gloucester, in New Jersey, about three miles below Philadelphia, on the Delaware. They were followed by the Swedes, who succeeded in establishing a settlement at Christina, (New Castle,) Delaware, in 1638. Under the leadership of Governor John Printz, the Swedes extended their settlement to Tinicum island, near Chester, within the present limits of Pennsylvania, in 1643, and from that time there was a continuous influx of immigrants, augmented in 1682 by the efforts of William Penn, who then commenced a systematic development of his newly-acquired territory.

During the most of this period, according to Martin's *History of Chester*, land vehicles were not used for traveling. "The Swedes used boats. The roads were generally mere paths through the woods which were free from undergrowth from the habit the Indians had of firing the woods every fall." As the Delaware river was navigable for ocean vessels, and afforded communication with European countries, from which supplies were obtained and accessions of colonists were received, the land along the river was naturally the first to be occupied; settlements spread along its banks, extending a very short distance into the interior, and the river was therefore the great thoroughfare.

The Establishment of Roads prior to William Penn's Ownership of the Province.—A historical sketch of Delaware county, contributed to Egle's *History of Pennsylvania*, says: "Tradition states that the first highway laid out in Pennsylvania was the present Essex street, [in the city of Chester,] which was to the west of the famous Essex House. Whether that be so can not now be determined. Martin claims that Edgmont street had that honor, while Armstrong states that the road to Darby was the first highway." The first important highway in Pennsylvania was the "horse-way" from the Swedish and Dutch settlements below Philadelphia to New York. Buck's *History of Bucks County* says that the turnpike from Philadelphia to Morrisville (opposite Trenton), through Bristol, is located without material deviation from this route. It was opened very early, nd in 1677 was called "the King's path." In Smith's *History of Delaware County* it is stated that the first road law was passed under Governor Andros in 1674. The Upland (Chester) Court about that time ordered that "highways should be cleared from place to place within the precincts of this government." On November 12, 1678, the same court ordered that "every person should within the space of two months, as far as his land reaches, make good and passable ways from neighbor to neighbor, with bridges when it needs, to the end that neighbors on occasion may come together. Those neglecting, to forfeit 25 guilders." A few months after, the court ordered the highways "to be cleansed" by "being made clear of standing and lying trees, at least ten feet broad."

During the period above embraced there were other roads in which Pennsylvania was interested, though they lay outside of her territorial limits. One of these roads is mentioned in Day's *Historical Collections* as the "Mine road," which the Dutch settlers of New York opened about 1616 from Esopus, now Kingston, on the Hudson river, to the "Delaware flats" in Monroe county, in this State, a distance of about 100 miles. This, it is said, was the first good road in the United States, and was constructed for the transportation to the Hudson river of copper ore obtained from the banks on the New Jersey side of the Delaware river. Over this road a party of settlers from the Dutch colony traveled to Pennsylvania, and occupied a part of Monroe county on the Delaware river. Samuel Preston, in *Hazard's Register*, says this settlement was made in 1660, but Henry's *History of the Lehigh Valley* states that it took place in 1710. These people used the Mine road for many years as their only means of communication with the outside world. Another of these roads, Westcott's *History of Philadelphia* says, was marked on Lindstrom's map in 1655. He located, about the present site of Bordentown, N. J., the road to Manhattan, (New York,) extending up the eastern side of the Delaware, which was used by the Swedes and Dutch residing along that river.

William Penn's Provisions for Roads.—Hazard's Annals of Pennsylvania states that on July 11, 1681, Penn published certain "conditions and concessions" agreed upon by him and the "adventurers and purchasers" in which he said: "Great roads from city to city not to contain less than 40 feet in breadth shall be first laid out and declared to be for highways, before the dividend of acres be laid out for the purchaser." In the original surveys an allowance of six acres to the 100 for roads was made to the first purchasers, and at the same time several were marked out on a regular plan, to be afterwards extended as necessity required. Penn proposed a series of highways on northwest lines parallel to one another, and running back from the Delaware to the interior, to be intersected by others as nearly at right angles as circumstances would permit. His plans were interfered with by the encroachments of settlers, and most of the roads were in point of fact laid out after petition to the council of the province.

The Establishment of Some of the Principal Roads in Southeastern Pennsylvania.—Advantage was taken of the roads that had then been laid out to establish in 1683 a weekly post-route between Philadelphia, New Castle, Chester and other settlements. Westcott says that in 1686 a road was ordered by the council to be laid out from Philadelphia to the falls of the Delaware, (Trenton,) and local roads were ordered about the same time, but it was nearly 1700 before they were really in fair condition, trees and stumps being left standing in many places. Davis's *History of Bucks County* says that the Durham road was begun in 1693, finished to Durham furnace in 1745, and extended to Easton in 1755. In Buck's *History of Bucks County* the following roads are named as projected before 1695: the County Line, Street, and Bristol roads; the road from Addisville to New Britain; the road from Churchville to the Neshaminy at Wrightstown—all of which are of considerable local importance. Westcott says the Gray's Ferry road, now a street in Philadelphia, was located in 1696, and the Ridge road, part of which is also a street, was laid out in 1698. A road from Philadelphia to Chester is stated in Martin's *History of Chester* to have been established in 1706, and called "the Queen's road." Buck says that Old York road was located in 1711; a branch of it to Doylestown and Easton was laid out in 1722; the road through Quakertown to Bethlehem in 1750. The road from Philadelphia to New Castle, Delaware, was located in 1748, and was soon after opened 60 feet wide.

The Opening of Roads in Central and Northeastern Pennsyl-

vania.—In Day's *Historical Collections* it is stated that in 1684 the farthest settlement in the interior was at Wrightstown, Bucks county, about fifteen miles from the Delaware. Settlements were gradually extended up the Schuylkill and other tributaries of the Delaware and farther toward the interior. In 1733 a road was surveyed from Lancaster to Philadelphia, and in 1736 it was extended to Harrisburg. An important early road to the Susquehanna river passed through Strasburg, about eight miles from Lancaster and was thence called the Strasburg road. In 1735 a road was laid out from Harrisburg which ran southwest from the Susquehanna river through Cumberland county, and was ultimately extended to Hagerstown and Cumberland. On it Shippensburg and Carlisle were afterwards built. A road was located from Wrightsville, York county, toward the Potomac river in 1739–40. It was 35 miles long, and afterwards became a great highway. Egle's *History of Pennsylvania* says that an early road was made from Philadelphia to Nathaniel Irish's mill at the mouth of Saucon creek in Northampton county, and Henry's *History of the Lehigh Valley* states that in 1743 the Moravians petitioned the courts of Bucks county for a "wagon road from Bethlehem to Saucon mill."

Pearce's *Annals of Luzerne County* states that the first settlers in the Wyoming valley, from Connecticut, in 1762 and 1763, crossed the Hudson river near Newburg, and, passing westward, crossed the Delaware at its junction with Shohola creek. Thence they followed an Indian path along Roaring brook to the Lackawanna river, and from that place proceeded by another Indian path to their destination. The emigrants of 1769 followed the same route, but having carts and oxen they used their axes and made the first wagon road from the Delaware river to the North Branch of the Susquehanna. In November, 1772, the settlers commenced to make a road from Pittston to the Delaware river near Stroudsburg, Monroe county, 40 miles distant. For this work they paid wages varying from one shilling sixpence to three shillings a day. When Sullivan's army marched from Easton to Wyoming in 1779 it opened a road which afterwards became a great thoroughfare. The settlers of Tioga county traversed Indian trails, but in 1785 a road was laid out from Athens to Milltown, and other roads followed. Blackman's *History of Susquehanna County* says that Ellicott's road, the first road in that county, is supposed to have been cut in 1786 for the transportation of supplies during the running of the State line between New York and Pennsylvania for which Andrew Ellicott was a commissioner on the part of Pennsylvania. In 1791 a road was cut from the Delaware river to Great Bend on the Susquehanna; in 1798, from Tunkhannock to Great Bend; in 1799–1801, from the forks of the Wyalusing to Great Bend.

In 1797 Mr. Williamson, the agent of Sir William Pulteney, opened a wagon road from the mouth of Lycoming creek, in Lycoming county, to Painted Post, in New York, for the purpose of opening Pultency's lands in New York to settlement by emigrants who traveled there by way of Philadelphia and Baltimore. In 1808 the State authorized a road to be opened from the Moosic mountains in Susquehanna county to the western boundary of the State.

Egle's *History of Pennsylvania* says that in 1770 or 1771 Reuben Haines, a rich brewer of Philadelphia, who owned a large body of land in Centre county, cut a road from the hollow below the Northumberland bridge, up along the south side of Buffalo valley, through the narrows into Penn's valley. In 1775 a road from Bald Eagle creek to Sunbury was laid out, and the main road through Buffalo valley was pushed up as far as the great plain in Centre county. A road from Northumberland to Williamsport was located in 1772. About 1800 a State road was run northwest from Milesburg, Centre county, to Waterford, Erie county, which was for years the only road that crossed the Alleghenies above Kittanning.

The Establishment of Roads in Western Pennsylvania.—About the middle of the eighteenth century adventurous pioneers had crossed the Allegheny mountains and made their homes on the tributaries of the Ohio river. During this time the chief means of communication were by canoes on the streams or by horseback through the forests, the only suggestion of a road usually being the "blazing" or marking of trees by an axe to guide the traveler. When an extensive journey was made with a canoe it was often necessary to leave a stream, where it became too shallow for navigation or was otherwise impassable, and the canoe and its freight were then carried to the next most convenient stream on the route. Such a transfer by land was called a "portage." About 1716 the French established a route from Lake Erie to the Ohio. A portage extended from Presque Isle or Erie to Le Boeuf, (now Waterford,) at the head of French creek, from which point the waters of French creek and of the Allegheny river were used. This was the first road opened in Western Pennsylvania.

In many parts of the State, as before alluded to, the settlers found paths through the woods plainly marked by the Indians, and many of these they long used. One of the best known of these paths crossed Pennsylvania from east to west, passing through the Juniata valley, crossing the Allegheny mountains at Kittanning Point in Blair county not far from Altoona, passing across Cambria county to Cherry Tree, and thence to the Indian village of Kittanning in Armstrong county. War parties of Indians and white traders and settlers all used this route. It was not passable for wheeled vehicles, but was only a "horse-way." This was the leading route to the Ohio river until 1753, when the Ohio Company partly completed a road from Cumberland, Maryland, to Fort Duquesne, afterwards Fort Pitt, now

Pittsburgh, which General Washington repaired in 1754; in 1755 General Braddock widened it throughout its length and extended it to six miles from Fort Duquesne, where his army was defeated by the French and Indians and driven back. This road was long known as Braddock's road, but was afterwards called the Cumberland road. The western part of Pennsylvania was crossed by an Indian path which extended from Canada to Florida, and had been used by the Indians for centuries: so says Judge Veech in his *Monongahela of Old.* Braddock's road followed a portion of its route. Many roads were cut through the forests of Western Pennsylvania during the early wars, which were afterwards used.

In 1758 General Forbes cut a road from Bedford to Pittsburgh, which passed through Hannastown, Westmoreland county, three miles from Greensburg: it became a part of the Chambersburg and Pittsburgh turnpike. In 1759 Colonel Burd opened a road from Braddock's road to the Monongahela river, where Brownsville now stands. Judge Veech says that the first petition for a road in Westmoreland county was addressed to the court in April, 1773. An outlet was wanted to Braddock's road. In 1774 the settlers in Indiana county marked paths through the woods to the flour-mills, because there were no roads. Egle's *History of Pennsylvania* says that on March 29, 1787, an act of Assembly was passed providing for the appointment of commissioners to lay out a "State Highway" between the waters of the Frankstown branch of the Juniata river and the Conemaugh river. This road, which is still known as the Frankstown road, reaches the Conemaugh at Johnstown, Cambria county, forming a passage way over the Allegheny mountains.

An enterprising scheme was carried into execution about 1796 by General James O'Hara, who engaged to bring salt to Pittsburgh from Onondaga, New York. Up to this time Pittsburgh had been supplied with salt from the Eastern cities, packed across the mountains on horseback or conveyed in wagons. General O'Hara, who had a contract to supply the garrison of Oswego, New York, with provisions, used vessels on the lakes and rivers on the route, but was compelled to cut roads for wagons at various points where land carriage or "portage" was needed. Salt was thus brought to Pittsburgh until about 1820, when salt wells which had been discovered in 1812 or 1813 on the Kiskiminetas river, only a few miles distant, were sufficiently developed to supply the home demand. In 1797 the Pennsylvania Population Company opened a great many roads in Erie county.

Roads Marked on Early Maps.—On Nicholas Scull's map of Pennsylvania, published in 1759, there were very few roads marked in Southeastern Pennsylvania. Four principal roads were placed in Chester county, five in Montgomery, and five in Bucks. The other part of the State was very meagerly supplied. On the map of Reading Howell, published in 1791, very great progress was noted. The roads were numerous in that part of the State east of the Susquehanna river and south of the Lehigh. Roads were marked from Reading to Sunbury and Catawissa; from Bethlehem to Neseopee Falls; from Bethlehem and Easton to Wilkesbarre and Tioga. A very few were located in the northeastern part of the State. West of the North Branch and north of the Juniata there were a few marked in the eastern and southern portions, but none in the northwest except the road to Waterford and a portage from Sinnemahoning creek to Conjua creek which flows into the Allegheny; in the south a portage was marked from the Juniata river to the Conemaugh. The roads in the southern part of the State converged at Bedford, thence separating west and southwest. In the southwestern part of Pennsylvania there were numerous roads marked.

After 1750 roads were rapidly opened in many parts of the State through the action of the provincial authorities, or were created by the courts appointing viewers to locate them, or were cut by the military forces in their movements over the country. In 1789 the Legislature very materially stimulated the establishment of roads by passing an act appropriating £10,000 annually for "a fund for claims and improvements, opening roads, improving navigation, and encouraging domestic manufactures."

Pack Horse Transportation.—Buck's *History of Bucks County* says that, "even when Bucks county had been settled more than three-quarters of a century, much in the way of transportation was done on horseback. Huge sacks, wallets and baskets or panniers were constructed on purpose. In this way nearly all produce was taken to Philadelphia, and horsemen would thus be seen nearly surrounded with poultry, pork, butter, flax, etc., and even live calves and sheep would be taken to market by these means." Pack horses were almost universally used at first for transporting merchandise over the State by land. The following description of this primitive mode of transportation is taken from Rupp's *History of Cumberland County*, published in 1848:

> The modes of transporting or conveying produce and other articles of commerce have been, like the highways, thoroughfares, or public roads, much improved within the memory of many now living west of the Susquehanna. Sixty or seventy years ago five hundred pack horses had been at one time in Carlisle, going thence to Shippensburg, Fort Loudon, and further westward, loaded with merchandise, also salt, iron, etc. The pack horses used to carry bars of iron on their backs, crooked over and around their bodies; barrels or kegs were hung on each side of these. Colonel Snyder, of Chambersburg, in a conversation with the writer in August, 1845, said that he cleared many a day from $6 to $8 in crooking or bending iron and shoeing horses for Western carriers, at the time he was carrying on a blacksmith shop in the town of Chambersburg. The pack horses were generally led in divisions of 12 or 15 horses, carrying about two hundredweight each, all going single file and being managed by two men, one going before as the leader and the other at the tail to see after

the safety of the packs. Where the bridle road passed along declivities or over hills, the path was in some places washed out so deep that the packs or burdens came in contact with the ground or other impeding obstacles, and were frequently displaced. However, as the carriers usually traveled in companies, the packs were soon adjusted and no great delay occasioned. The pack horses were generally furnished with bells, which were kept from ringing during the day drive, but were let loose at night when the horses were set free and permitted to feed and browse. The bells were intended as guides to direct their whereabouts in the morning. When wagons were first introduced, the carriers considered that mode of transportation an invasion of their rights; their indignation was more excited and they manifested greater rancor than did the regular teamsters when the line of single teams was started some thirty years ago.

The pack horses when on their journey were fastened to one another, the head of one horse being tied to the tail of the horse in front of him. Day, in his *Historical Collections*, says that "Mercersburg, in Franklin county, was in early days an important point for trade with Indians and settlers on the Western frontier. It was no uncommon event to see there 50 or 100 pack horses in a row, taking on their loads of salt, iron, and other commodities for the Monongahela country." The iron made in the Juniata valley was first conveyed to the Philadelphia and Pittsburgh markets in this expensive way. In *Harper's Monthly* for September, 1877, Edward Howland says that in 1784 the cost of transportation by pack horses from Philadelphia to Erie was $249 a ton, and in 1789 the crank for the first saw-mill built in Ohio was carried by pack horses over the mountains to the Youghiogheny river, and thence shipped by water to its destination on Wolf creek, sixteen miles from Marietta. The crank weighed 180 pounds, and was made in New Haven, Conn., for the New England Ohio Company.

The Use of Wagons.—When heavy hauling was necessary it was as far as possible done in the winter with sleds, and therefore that season of the year witnessed the largest business in those towns depending upon trade with farmers. Henry's *History of the Lehigh Valley* says that, about 1783, "farmers from a distance generally awaited good sledding in winter as the most convenient manner of transportation. Very frequently the streets of Easton presented a very busy scene, 500 sleds either standing in the streets or passing through them, and sometimes from 15,000 to 20,000 bushels of grain were received by the merchants in one day. The mills and storehouses were crowded and ofttimes overloaded with their precious burden." Even at the present time, in the mountainous districts and the lumber region of the State, most of the hauling is done in the winter.

Wagons came into use gradually, after roads had been opened for them. Much opposition was manifested against the widening of the bridle paths by the owners of pack horses, who foresaw the loss of their occupation in the introduction of wagons. Bishop's *History of American Manufactures* says that in 1750 only the best farmers had carts on their farms. Most of them used sleds both in summer and winter. The construction of wagons was at first very rude; little or no iron was used; the wheels were generally of solid wood cut with the saw from the end of a log. It would require the strength of two horses to draw one of these wagons, as the roads were made with little regard to the removal of rocks or stumps or the bridging of streams. The farmers of the southern counties were better furnished with wagons than those living in other parts of the State, as in 1755 Benjamin Franklin, then postmaster-general of North America, obtained 150 wagons, besides 250 pack horses, in York, Lancaster, and Cumberland counties for Braddock's expedition.

The historian Rupp says that Conestoga wagons were first used about 1760. They were huge vehicles, drawn by teams of six, eight or more horses, and their use gradually extended over Pennsylvania and to points outside of the State both West and South. In the course of time they superseded pack horses, as the roads were improved, and they made regular trips hauling merchandise until displaced by canals and railroads. They were called Conestoga wagons because the large, powerful horses which drew them were first obtained from the vicinity of Conestoga creek in Lancaster county. Day says that in 1843 the numerous inns in Lancaster, "far too many for the present wants of the city, tell of by-gone days, before the railroad and canals were constructed, when the streets and yards were crowded every evening with long trains of Conestoga wagons passing over the turnpike, by which nearly all the interior of the State was supplied with merchandise."

The first wagon-load of merchandise taken over the Allegheny mountains was hauled from Hagerstown, Maryland, to Brownsville, Pennsylvania, in 1789, by John Hayden, the discoverer of iron ore in Fayette county. The distance was 140 miles, and the cost of transportation was $3 per hundredweight. The round trip consumed one month. The rivers in those days were forded when practicable, but, if too deep for fording, ferries were established by the pioneers. At first the ferry boats consisted of canoes lashed together, but plank scows were afterwards made which were propelled across the streams by oars or pushed by poles. There were few bridges until nearly the close of the last century.

The Construction of Turnpikes.—No attempt was systematically made to properly fit the rude early roads for wagon traffic until

1792, when a turnpike from Philadelphia to Lancaster, 62 miles long, was commenced by a private company. It was finished in 1794, at a cost of $465,000, and was the first stone turnpike in the Union This progress in roadmaking, though slow, compares rather favorably with that of modern European countries, for after the decline of the Roman empire roads were neglected, and even in England the year 1770 found the journey from Liverpool to Manchester, according to the account of Arthur Young, "not a little perilous from the bad condition of the road." Within the next sixty years, or until the introduction of railroads, the common roads of England were very greatly improved. Much progress was made in Pennsylvania after the completion of the Philadelphia and Lancaster turnpike. Within forty years from that time 220 companies were chartered to construct turnpikes, and every part of the State was brought into better communication with the other parts through these facilities.

Among the most important of the earliest turnpikes may be named the following in Southeastern Pennsylvania: Philadelphia and Lancaster, commenced in 1792; Germantown and Perkiomen, 1801; Cheltenham and Willow Grove, 1803; Chestnut Hill and Spring House, 1804; Philadelphia, Bristol and Morrisville, 1804; Philadelphia, Brandywine and New London, 1810; Perkiomen and Reading, 1811; Ridge, 1812; Spring House and Bethlehem, 1814. In Central and Southern Pennsylvania: Lancaster and Susquehanna, commenced in 1801; York and Maryland line, 1807; Centre, 1808; Gettysburg and Petersburg, 1809; Gap and Newport, 1809; Chambersburg, 1812; Hanover and Carlisle, 1812; Little Conestoga, 1812; Danville, 1814; Chambersburg and Bedford, 1815; Harrisburg, Carlisle and Chambersburg, 1816; York and Gettysburg, 1818. In Northeastern Pennsylvania: Susquehanna and Lehigh, commenced in 1804; Easton and Wilkesbarre, 1805; Coshocton and Great Bend, 1806; Milford and Owego, 1809; Bethany and Dingman's Choice, 1812; Bridgewater and Wilkesbarre, 1813; Bellmont and Easton, 1817; Susquehanna and Tioga, 1818. In Western Pennsylvania: Erie and Waterford, commenced in 1807; Greensburg and Pittsburgh, 1814; Bedford and Stoystown, 1815; Huntingdon, Cambria and Indiana, 1815; Stoystown and Greensburg, 1816; Mercer and Meadville, 1818; Susquehanna and Waterford, 1818; Pittsburgh and New Alexandria, 1819.

In some parts of the State, where lumber was very cheap, plank roads were made from about 1850, consisting of sawed planks laid across the leveled earth, thus making a very smooth course. Corduroy roads, made of the trunks of trees thrown across the road, were used only in swampy places, and did not extend for any noticeable distance.

The National Road.—The establishment of a good means of communication between the settlements east of the Allegheny Mountains and those west engaged the attention of the national authorities after our independence had been secured, and the wisest statesmen of the time were in favor of the construction of internal improvements by the General Government. This policy, however, met with such strong opposition that no appropriations were for a long time made absolutely from the national treasury for internal improvements. Although the National road was constructed by the United States Government, yet this work was undertaken, says Egle's *History of Pennsylvania*, in pursuance of a compact with Ohio in 1803 upon its admission as a State into the Union, by which, in consideration that Ohio would not tax lands sold by the United States within its territory for five years after sale, the Government would apply two per cent. of the proceeds of those sales to making a road from the navigable waters emptying into the Atlantic to the Ohio river opposite the State. The road from Cumberland, Maryland, to Wheeling, West Virginia, was undertaken under an act passed March 29, 1806. The commissioners to select the route were Eli Williams and Thomas Moore, of Maryland, and Joseph Kerr, of Ohio. Judge James Veech, in his *Monongahela of Old*, referring to this work, says:—"It was begun in 1806, but not much was done on it until after the close of the war, and it was completed to Wheeling about 1822. It cost, originally, nearly $1,700,000; which (131 miles) is an average of nearly $13,000 to the mile. The Eastern section, from Uniontown to Cumberland, (63 miles,) cost about $14,000 per mile; the Western section not so much. Mr. Albert Gallatin was the originator of its plan of construction. In accordance with a resolution of the United States Senate, Mr. Gallatin, then Secretary of the Treasury, submitted a report in 1808 on roads and canals, in which he recommended aid to several undertakings therein enumerated. He recommended four roads—from the Allegheny, Monongahela, Kanawha, and Tennessee rivers to the Susquehanna, Potomac, James, and Santee rivers. The second road only was built."

According to Benton's *Thirty Years in the United States Senate*, this road was extended and improved for a series of years at a total cost of $6,670,000, and at length was abandoned in 1836 to the States through which it ran upon terms the most important of which provided for keeping it in repair by tolls. At that time it reached from Cumberland, Maryland, to the southwestern part of Illinois, passing through portions of Maryland, Pennsylvania, and Virginia, (now West Virginia,) and crossing Ohio and Indiana. The most important town on the road in this State is Brownsville, Fayette county. When completed, the road was opened 66 feet wide; the road bed was 30 to 34 feet wide; it was paved 20 feet wide, 18 inches deep in the middle, and 12 inches deep at the edges. The lower stratum or bed was in parts of the road a pavement of stone closely set vertically, and in other parts of stone broken to go through a 7-inch ring; it was all covered six inches deep with a stratum of stone broken to go through a 3-inch ring. Before the era of railroads it was one of the best known roads in the country, having countless stages running over it, and being the great middle route for emigrants to the West, who in those days drove their wagons containing their families and outfit all the way from their Eastern homes to the Western prairies. The National road crossed three counties of Pennsylvania: Somerset, Fayette, and Washington.

The Pittsburgh Turnpikes.—In 1807 there were three completed turnpikes from Philadelphia to Harrisburg—one through Downingtown and Ephrata, one through Reading, and one through Lancaster; and two turnpikes from Harrisburg to Pittsburgh were projected—the northern route running along the Susquehanna river and then up the Juniata through Lewistown, Huntingdon, Hollidaysburg, Ebensburg, Blairsville and New Alexandria, and the southern route passing through Carlisle, Shippensburg, Chambersburg, McConnellsburg, Bedford, Stoystown and Greensburg. The northern turnpike was undertaken under the authority given by an act passed on March 4, 1807, incorporating a company to make a turnpike from Harrisburg through Lewistown and Huntingdon to Pittsburgh. On March 20, 1810, a supplementary act incorporated a company to construct the Huntingdon, Cambria and Indiana turnpike. The southern turnpike was commenced in 1808. Both routes were completed about 1820.

In 1832 Gordon's *Gazetteer* estimated that up to that time more than 3,000 miles of turnpike had been authorized by law, and that about 2,400 miles had been constructed. Since that year the number of turnpikes has largely increased, but railroads have multiplied to such an extent that roads and turnpikes are now almost entirely used for local traffic. Yet the loss of their early importance in supplying the only means of communication between distant points has not caused them to be neglected. To-day the roads of Pennsylvania are among the best in the United States. Numerous turnpikes are still managed by corporations, which derive some profit from their constant use, and every township, taxing itself for the purpose, annually repairs the ordinary public roads within its limits, always maintaining them in passable condition, and in many localities macadamizing them and rendering them fully equal to the best turnpikes.

The Conveyance of Mails and Passengers.—In the infancy of all of the early settlements letters were carried by travelers or traders, or by messengers specially intrusted with them. The regular conveyance of the mails followed the increase in population and the opening of roads. Travelers used their own horses or walked or "boated" themselves to their destinations. In 1683 William Penn established weekly post-routes between Philadelphia, Chester, New Castle, and other settlements, and from that time may be dated the commencement of public mail facilities in Pennsylvania. The beginning of the conveyance of passengers in public coaches probably dates from 1732, when Davis's *History of Bucks County* says a line of stage "wagons" was run between Burlington, in New Jersey near Philadelphia, and Amboy, in New Jersey near New York, connecting at each end of the line with water communication to New York and Philadelphia. These "wagons" had no springs, and they made but one trip a week. In 1752 passengers were carried twice a week. The first stage coach which ran directly from Philadelphia to New York was put upon the road in 1756 by John Butler, and it took three days to pass from city to city. It crossed the Delaware river by means of a ferry boat from Morrisville to Trenton.

In 1784 Frederick Shaeffer established a line of coaches between Philadelphia and Lancaster which took three days for the round trip Craig's *History of Pittsburgh* says that about 1786 a mail route was established between Pittsburgh and Philadelphia, providing a delivery once in two weeks. In 1789 a two-horse coach was started to run weekly between Reading and Philadelphia, taking two days to make a passage through. Post-offices were established at Bethlehem and Easton in 1792, and at Reading in 1793. A weekly stage commenced to run between Philadelphia and Easton in 1796. The *American Annual Register* for 1796, published January 19, 1797, gives the following description of the traveling of that period: "The roads from Philadelphia to Baltimore exhibit, for the greater part of the way, an aspect of savage desolation. Chasms to the depth of six, eight or ten feet occur at numerous intervals. A stage coach which left Philadelphia on the 5th of February, 1796, took five days to go to Baltimore. The weather for the first four days was good. The roads are in a fearful condition. Coaches are overturned, passengers killed, and horses destroyed by the overwork put upon them. In winter, sometimes, no stage sets out for two weeks."

Bishop's *American Manufactures* says: "In 1796 four daily stages ran from Philadelphia to New York; a daily stage ran to Baltimore; and once or twice a week stages ran to Lancaster, Bethlehem, Wilmington, Dover, Harrisburg, Reading, and Easton. In that year Philadelphia owned 307 four-wheeled carriages and 553 two-wheeled. In September, 1786, an order was made by the Government to establish a post between Philadelphia and Pittsburgh, but on the 1st of October, 1790, the postage for the preceding year was stated to be only $110.99. Prior to this time all correspondence had been carried by travelers or a special express." At the close of the year 1800 the mail was carried from Reading to Sunbury once a week on horseback. A post-office was established at Athens, Bradford county, in 1800. Egle's *History of Pennsylvania* says that in the month of August, 1804, the first through line of coaches from Philadelphia to Pittsburgh was established, and the time occupied in making the journey one way was about seven days. The course lay through Lancaster, Harrisburg, Carlisle, Shippensburg, Bedford, Somerset, and Greensburg. The turnpike to Pittsburgh over the same route, Gordon says, enabled "a coach drawn by four horses to travel from Philadelphia to Pittsburgh, a distance of 303 miles, in sixty hours, and on shorter journeys at the rate of from four to seven miles the hour." According to Pearce's *Annals of Luzerne County*, large four-horse coaches for the conveyance of mails and passengers were introduced throughout Northern Pennsylvania from 1816 to 1824. In 1828 a daily stage line was established from Philadelphia to Pittsburgh. Egle's *History of Pennsylvania* says that the price of passage by stage from Philadelphia to Pittsburgh, for some time before and after 1830, was $18 to $22; freight charges by Conestoga wagons were from 3 cents to 5 cents per pound. The opening of the main line of State improvements from Philadelphia to Pittsburgh in 1834 diverted travel from the stage lines, but as the canals which formed the greater part of the route were frozen over during the winter, rendering a recourse to stages necessary, they were not wholly superseded on this line of travel until the opening of the Pennsylvania railroad in 1852.

In a sketch of the *Civil Engineering of America*, by David Stevenson, printed in London in 1838, the following description of the road in 1837 from Pittsburgh to Erie occurs:

> On the road leading from Pittsburgh on the Ohio to the town of Erie on the lake of that name, I saw all the varieties of forest roadmaking in great perfection. Sometimes our road lay for miles through extensive marshes, which we crossed by corduroy roads, formed of trees cut in lengths of about ten or twelve feet, and laid close to each other across the road to prevent vehicles from sinking; at others the coach stuck fast in mud, from which it could be extricated only by the combined efforts of the coachman and passengers, and at one place we traveled for upwards of a quarter of a mile through a forest flooded with water, which stood to the height of several feet on many of the trees, and occasionally covered the naves of the coach wheels. The distance of the route from Pittsburgh to Erie is 128 miles, which was accomplished in 46 hours, being at the very slow rate of about 2¾ miles an hour, although the conveyance by which I traveled carried the mail and stopped only for breakfast, dinner, and tea, but there was considerable delay caused by the coach being once upset and several times "mired."

There are comparatively few portions of the State in which traveling is now done by means of stages, and even in those localities the journey thus taken seldom occupies an entire day of twelve hours. The railroads with several trains a day have almost swept into oblivion the ancient conveyances which ran only once or twice a week, or once a day in the more favored localities.

Early Bridges.—In Martin's *History of Chester* some quotations are made from ancient records of the court in reference to bridges, and these were undoubtedly among the first in the State. In 1686 the court ordered the erection of a "horse bridge" over the creek near Chester and over Crum creek on the King's road. In 1700 a drawbridge was built over the creek at Chester. During those days streams were forded wherever practicable, and ferries were established when necessary. Westcott's *History of Philadelphia* says that a ferry over the Schuylkill river at Market street, Philadelphia, was in operation in 1685. The principal ferries on the Susquehanna river were Harris's ferry, which crossed that river where Harrisburg now stands, and Wright's ferry at Wrightsville, both of which were established about 1735. Ferries were quite numerous on the principal rivers of the State until bridges were built. Temporary structures or bridges over insignificant streams were built in the most thickly-settled parts of the State from a very early date, but the erection of more ambitious works over such streams as the Delaware, the Schuylkill, the Lehigh, the Susquehanna, etc., were not undertaken until nearly the close of the last century, when so many of an excellent character were built that Pennsylvania was often called "the State of bridges." A few of the first of these bridges will be mentioned.

From a report on roads, bridges, etc., read in the Pennsylvania Senate, March 23, 1822, the following are selected as the oldest bridges mentioned, with the dates of the incorporation of the companies by which they were built: Bridge over the Susquehanna, four miles below Wrightsville, 1793; over the Delaware, at Easton, 1795; over the Lehigh, near Bethlehem, 1797; over the Schuylkill, at Market street, Philadelphia, 1798; over the Delaware, at Trenton, 1798. The following were some of the most important bridges which followed the above: Bridge over the Susquehanna, at Wilkesbarre, 1807; at Northumberland, 1809; at Columbia, 1809; at Harrisburg, 1809; over the Monongahela, at Pittsburgh, 1810; at Brownsville, 1810; over the Allegheny, at Pittsburgh, 1810. *Hazard's Register* says the Schuylkill river bridge at Market street, Philadelphia, erected by the company above noted as incorporated in 1798, "was the first great structure of the kind in America. It cost $300,000." It was a wooden bridge. The Columbia bridge over the Susquehanna, above named, stood until June 28, 1863, when it was burned by the Union forces under Colonel Frick to prevent the advance eastward of the rebel invading forces, a portion of whom had occupied Wrightsville, at the western end of the bridge. It was a covered wooden bridge a mile and a quarter long, and stood on 23 piers. It was afterwards rebuilt. Many turnpike and railroad bridges were destroyed in Southern Pennsylvania by General Lee's rebel army, which was defeated by General Meade at Gettysburg in July, 1863, and driven back. A notable bridge in its day was the bridge built of stone at the crossing of the Reading turnpike over the Perkiomen creek in Montgomery county, about seven miles from Norristown, in 1798-99. The bridge consisted of several arches, and entailed a heavy expenditure upon the county which undertook the work. A patent iron, chain suspension bridge, over Jacob's creek, in Western Pennsylvania, of seventy feet span, was built in 1801 by James Finlay. Two similar bridges were built near Brownsville a very short time afterward, of 112 and 120 feet spans.

The first wire suspension bridge in the United States was built by Charles Ellet over the Schuylkill river at Callowhill street, Philadelphia, in 1842. Its span was 343 feet, and its width 27 feet. It cost $50,000. The wire was made at Easton of Juniata iron. The predecessor of this suspension bridge was a wooden bridge of a single span of 340 feet, built in 1813 by Lewis Wernwag, at a cost of $120,000. It was the longest wooden span in the world. It was burned in 1838. The wire bridge which was completed in 1842 stood until 1874, when it was condemned as unsafe and pulled down. In 1876 a two-story iron truss bridge was completed on its site by the Keystone Bridge Company, of Pittsburgh. A short distance above the Callowhill street bridge in Philadelphia stands the Girard avenue bridge, completed July 4, 1874. It is an iron bridge, built by Clarke, Reeves & Co., of Phœnixville, Pa., and is the widest bridge in the world. Its dimensions are: 1,000 feet in length, and 100 feet in width. It cost $1,000,000. Numerous bridges in close succession now span the Schuylkill from a short distance above its mouth to its headwaters in the anthracite coal region, many of them being iron bridges. In the vicinity of Pittsburgh there are several bridges worthy of note; prominent among which are the wire suspension bridge over the Monongahela, built in 1846 by John A. Roebling, another over the Allegheny, built in 1852 by the same engineer, and the chain suspension bridge over the Monongahela, completed in 1877 by the American Bridge Company of Chicago.

The rapid progress made in every direction by the people of Pennsylvania is strikingly indicated in the number and character of the bridges which now span the countless streams of the Commonwealth. The impatient traveler no longer waits for weary days for the subsidence of a flood to enable him to ford the rivers or to be ferried across them, as substantial bridges connecting with all the principal roads and turnpikes overcome these once formidable obstacles.

In the State financial statement for the year 1831, among the assets are noted $1,911,243.39 in turnpike stock and $410,000 in bridge stock. Since then this amount has been largely increased—the exact amount is not known. Since the Revolution Pennsylvania has been actively interested in public improvements; turnpikes, bridges, canals, and railroads being alike assisted in their construction in accordance with this sagacious policy, the result of which has long been seen in the superior development of its great resources thus rendered accessible.

Early Attention to Navigation.—From a very early period in the history of the State, down until intercourse between the different sections was very generally secured by the State system of public improvements, there was in practice an efficient system of descending navigation on most of the streams of Pennsylvania that could thus be utilized. Thomas Budd, in his *Account of Pennsylvania and New Jersey*, published in 1685, thus alludes to the earliest use made of the Delaware river: "After great rains we may bring down great quantities of goods in flat-bottomed boats, built for that purpose, which will then come down by reason of the floods with speed." This State possesses peculiar advantages in this respect; from almost every part of it transportation can be had by water—during the spring floods, if at no other time. The Delaware and its tributaries in the eastern part of the State, the Susquehanna and its far-reaching branches in the central part, and the Ohio and its broad affluents in the western part, together constitute a system of rivers which afford natural highways for the transportation of products from all sections of Pennsylvania.

Rafts were used in the descending navigation of the streams, both for the conveyance of lumber and of agricultural products, and rude boats called arks were devised, made of rough lumber put together very strongly in the shape of a box, which were loaded with articles to be transported, and were then floated, paddled, or poled down the stream. Some of these arks were large enough to carry 500 barrels of flour. The vessels were broken up and sold for their lumber at the place of destination, and the adventurous voyagers walked home. Coal was thus shipped down the Lehigh and Delaware rivers to Philadelphia, down the Susquehanna to Columbia and points below, and down the Allegheny and Monongahela to Pittsburgh and points below on the Ohio; iron and flour were shipped from Huntingdon down the Juniata and Susquehanna to Baltimore; iron and salt were sent down the Conemaugh and Kiskiminetas to Pittsburgh. Prior to 1793 rafts and arks seldom ventured below Middletown on the Susquehanna river, on account of the Conewago falls in that river below Middletown, which interposed a dangerous obstacle to further navigation. The trade thus intercepted there left the river and reached Philadelphia by land transportation. In 1793 a canal was cut around the west side of the falls, followed by another on the east side in 1814, and Baltimore then secured the Susquehanna river trade. John Kreider, of Huntingdon, took the first ark to Baltimore in 1796, laden with flour. Pearce says, in his *Annals of Luzerne County*, that thirty lumber rafts passed down the Susquehanna river in 1796. In 1804 sawed lumber went down—552 rafts with a total of 22,000,000 feet. When the Union Canal was opened in 1827, from Middletown to Reading, connecting with the Schuylkill Canal to Philadelphia, a portion of this large business was regained by Philadelphia, and much more was recovered in 1834, after the opening of the main line of State improvements.

In the Pennsylvania canal commissioners' report dated February 6, 1827, it is stated that 2,000 arks loaded with lumber, flour, etc., descended the Susquehanna to points below Harrisburg in 1826. In the *History of the Lehigh Coal and Navigation Company*, a certificate is printed, signed by five citizens of Catawissa, Columbia county, dated May 24, 1833, which states that "in six days, from the 18th to the 23d of this month, there floated down the North Branch of the Susquehanna, past the village of Catawissa, 2,688 arks and 3,480 rafts, the latter bearing top loading to the amount of at least 5,040 tons." The average weight of the arks and rafts was estimated at 45 tons, making the whole, including the "top loading," amount to 282,600 tons. This was during a freshet, the only time when the river was available for navigation. In 1840 the lumber floated down the Susquehanna was estimated at 250,000,000 feet. Most of the streams of Pennsylvania were, like the Susquehanna, too shallow for constant use by boats, and the voyagers were compelled to wait for floods and freshets which, while they rendered the passage dangerous, at the same time made it possible.

On some of the mountain streams of the State logs are yet "splashed" down the channel, as thus described in Egle's *History of Pennsylvania*: "A dam is constructed over the stream, and the water is pent up until it becomes a large body; the timber is put into the stream below; at the proper time the sluices or gates are opened, and the timber is floated down." Logs are now rafted to saw-mills on the lower courses of the rivers, but sawed lumber is chiefly transported by railroads and canals, a great change having taken place in this respect within a moderately recent period.

In 1812 an effort was made to establish a shipyard at Wilkesbarre, to build ships for ocean service. Its projectors entertained the idea that ships of small tonnage could be built there and floated down the Susquehanna to Chesapeake bay in times of freshets or floods. They launched a sixty-ton vessel in that year, named it the *Luzerne*, and started it down the Susquehanna during high water. At the Conewago falls below Middletown it was dashed to pieces, and its builders then became disheartened and abandoned the shipyard.

Methods Employed in Ascending Navigation.—Egle's *History of Pennsylvania* says: "Many of the settlers on the head waters of the Susquehanna river took their families and goods in canoes up that stream. These canoes were generally managed by a steersman and a bowsman, who placed steel-pointed setting poles upon the bottom of the river, upon which they threw their whole weight and force, and thereby propelled their canoes forward, and by such continued efforts frequently made 25 miles a day against the current, carrying in their canoes from three-fourths of a ton to one ton at a trip. In case of low water in the streams, the boat crew would be compelled to remove the gravel and fragments of rock from the line of their course, and wade for miles at a time in the stream, carrying and dragging their boats forward." This was probably the manner in which rivers were ascended until Durham boats were invented about 1750. Davis's *History of Bucks County* says "The first Durham boat was built on the Delaware river bank by one Robert Durham, the manager and engineer of the furnace, and the boat was made nearly in the shape of an Indian canoe." The furnace referred to was Durham furnace in the northeastern part of Bucks county. Pearce, in his *Annals of Luzerne*, thus further describes these boats: "Durham boats were sixty feet long, eight feet wide, and two feet deep, and when laden with fifteen tons drew twenty inches of water. The stern and bow were sharp, on which were erected small decks, while a running board extended the whole length of the boat on each side. They carried a mast with two sails, and were manned by a crew of five men, one steering and four pushing forward with setting poles, two being on each side." In the navigation of Eastern rivers these boats were of much service. The "keel boats" used on Western rivers were substantially the same kind of boats.

The Navigation of Western Rivers.—The Ohio river was navigated very early. In Thurston's *Pittsburgh and Allegheny in the Centennial Year* the first account of the carrying trade to Pittsburgh is that of the use of batteaux in 1756 by the French to take supplies from the Mississippi to Fort Duquesne.

In 1776 Messrs. Gibson and Linn descended by water from Pittsburgh to New Orleans, and brought back a cargo of 136 kegs of gunpowder. On reaching the falls of the Ohio, in the spring of 1777, they were obliged to unload their boats and carry the cargo around the rapids. The powder was delivered at Wheeling, and afterwards transported to Fort Pitt. In 1777 the building of batteaux began on the Monongahela, a party of carpenters having been sent out from Philadelphia for that purpose, and larger boats were afterwards built there. Flat boats with "sweeps" or long oars were used on the Ohio very extensively. A line of mail boats was established from Wheeling to Limestone, (Maysville,) Kentucky, in July, 1794, to run once every two weeks. These boats were built like whale boats, were twenty-four feet long, were steered with a rudder, and were manned by one steersman and four oarsmen, who carried muskets and ammunition. The mail was carried on horseback from Wheeling to Pittsburgh. In 1798 two armed galleys, *President Adams* and *Senator Ross*, were built at Pittsburgh for the United States Government—the first sea-going boats ever built there. In 1801 Louis Anastasius Tarascon built sailing vessels at Pittsburgh, which made voyages thence to St. Thomas in the West Indies, to Philadelphia, and across the Atlantic. The first vessel he built was named the *Amity*.

The use of keel boats began on the Western Pennsylvania rivers at an early period. They were built like the hulls of modern canal boats, and would carry on an average about 30 tons. They were propelled by sails, pushed by poles, or towed by horses which walked along the banks, and they made voyages both up and down the streams. As they made regular trips, they were a great convenience in their day for passengers as well as for freight. Passengers, however, were compelled to land every night, and they lodged at the most convenient farm house, every man's house in those days being open for the entertainment of wayfarers. In 1794 packet boats for passengers began to run down the Ohio from Pittsburgh. For protection from hostile Indians they were built strongly and carried cannon and other arms. Passengers slept on these packets. Keel boats were used on the Allegheny river, along its upper course, long after canals connected Pittsburgh with the East. Iron rails were shipped by such boats from the Great Western ironworks at Brady's Bend to Pittsburgh in 1847.

Coal was first carried down the Ohio in large boats propelled by very wide oars, which were consequently called "broad horns." These boats were broken up at the end of their journey, and the lumber was sold. Thurston says:

> Until 1850 the coal exported from Pittsburgh was floated down the river in large, flat-bottomed boats, which were usually 125 feet long, 16 feet wide, and 8 feet deep, with flat perpendicular sides, bow, and stern. Each boat of this size held about 15,000 bushels of coal, and they were floated to their destination lashed in pairs. The usual complement of hands for such boats was 23 or 24. These boats could only be floated down the river in the high floods that generally, from time to time, in the spring and fall of each year, swell the current of water in the Ohio river. In 1850 the towing of coal was begun, the *Lake Erie* making three trips, with four barges each time, carrying 16,000 bushels. The tows now consist of 12 barges and one steam towboat, the barges averaging 450 tons, and the steam towboats 150 tons. The barges hold about 12,000 bushels of coal apiece, and are about 130 feet long and 24 feet wide, costing from $500 to $1,000 each. They are lashed to one another and to the steam towboat, which is in the centre of the rear and pushes its load instead of dragging it. The time to New Orleans is two weeks, and the return trip three or four weeks. The bulk of this coal comes from the Monongahela river collieries.

The *Lake Erie* was the first steamboat that towed coal from Pittsburgh, but the experiment was successfully accomplished several years before, from the Pomeroy (Ohio) mines. Andrew Roy, in *The Coal Mines*, says:

> The cost and scarcity of boats to transport coal down the river induced the proprietors of the Pomeroy mines to build a steam towboat to transport the loaded coal boats from the mines to Cincinnati, and bring them back unloaded. A gang of ship carpenters (the late John S. Beacham at their head), caulkers, etc., were brought from Baltimore to Pomeroy, in 1835, to build the tug, which they named the *Condor*. She took the first tow to Cincinnati, in January, 1836, and was the first towboat on the Ohio river.

Shipbuilding on Lake Erie.—Egle's *History of Pennsylvania* contains the following statement, which refers to the first vessel built on Lake Erie: "In 1679 Robert Cavalier de la Salle constructed, beneath the sombre shades of the forest which fringed the northern shore of Lake Erie, a craft of sixty tons burden, which he named the *Griffin*, and, setting sail, ploughed the waters of the Great Lakes, hitherto unvexed by the keel of civilized man." Wood's *Shoulder to the Wheel of Progress* says the first vessel built on the American side of this lake was the *Good Intent*, of forty tons, built by Captain William Lee, about 1795, in Erie county, near Erie.

Steam Navigation.—The rivers of Pennsylvania were among the first upon which propulsion by steam was attempted. William Henry of Chester county tried a steamboat upon the Conestoga in 1763, but it was not successful. This was before James Watt perfected the steam engine, which he did in 1769. John Fitch, a native of Connecticut, placed an experimental steamboat on the Delaware river in 1786, which worked satisfactorily but was not put to practical use. He built another in 1788, the *Perseverance*, which ran regularly between Philadelphia and Burlington for the transportation of passengers, being the first successful use of a steamboat for any purpose. It was improved in 1790, but in 1792 it was laid up on account of financial troubles and was not used afterwards. In 1804 Oliver Evans, an ingenious Philadelphia mechanic, constructed a steam dredge boat which propelled itself from his shop to the river, being mounted on wheels, and after it was launched the engine was attached to paddle-wheels and the boat ran itself to its station. In 1807 Robert Fulton, a native of Lancaster county, Pa., and Chancellor Livingston, of New York, built the steamboat *Clermont* and launched it upon the Hudson river. They procured from the Legislature of New York a monopoly of steam navigation within the limits of the State which continued until Fulton's death in 1815. John Stevens, of Hoboken, New Jersey, built the *Phœnix* in 1807, after the *Clermont*, and, being debarred from the navigation of the Hudson by Fulton's monopoly, sent it around by sea from New York to Philadelphia under the charge of his son, Robert Livingston Stevens. The *Phœnix* was put to use on the Delaware and was quickly followed by other steamboats. Steam navigation on the Ohio dates from 1811.

Dr. Ryland T. Brown, of Indianapolis, who lived near the Ohio river below Cincinnati in 1811, furnishes us with the following statement:

> Early in 1811 Robert Fulton formed a company at Pittsburgh to build a steamboat to navigate the Ohio and Mississippi rivers. The keel-boat builders at Marietta, which at that time possessed the principal shipyard on the Ohio, obtained the right to run a boat by steam, procured an engine from Philadelphia, and fitted up a keel boat, that had previously been built, with the engine and a stern wheel. The engine had a vertical cylinder, and it and the boiler were placed in the hold, amidship, and a great wooden walking-beam conveyed the power to the wheel. This boat, named the *Enterprise*, descending the Ohio, reached Cincinnati the last of October or first of November, 1811. To satisfy the Cincinnatians, the *Enterprise* made a trial trip to

Maysville to demonstrate its ability to run against the current. The boat, descending the river, stopped at Louisville a few days, and continuing its voyage reached New Madrid at the time of the great earthquake, November 24, 1811, in which it was damaged so seriously that it had to stop some weeks for repairs, after which it returned to Pittsburgh, and ran as a regular packet between that place and Louisville. Fulton's boat, named the *Experiment*, while on the stocks, was finished and descended the river in March, 1812, and passed on to New Orleans, where it was received with great demonstrations, and an arrangement was made that it should run regularly between New Orleans and Louisville. On the consummation of this arrangement the name of the boat was changed to the *New Orleans*.

In *Pittsburgh: its Industry and Commerce*, published in 1870, it is stated that Messrs. Fulton & Livingston commenced the construction of steamboats at Pittsburgh in 1811, Nicholas J. Roosevelt working under their instructions. The *New Orleans* was the first steamboat he built, and the work just quoted states that it left Pittsburgh on its trial trip October 11, 1811, and afterwards ran between New Orleans and Natchez until 1814, when it was wrecked. It was between 300 and 400 tons burden and cost $40,000. The second steamboat built at Pittsburgh was the *Comet*, launched in 1813. In 1814 the Mississippi Steamboat Company built the *Vesuvius* and the *Etna*. From 1811 to 1835 there were 304 steamboats built in the vicinity of Pittsburgh, of which 197 were built within the city limits.

The *Phœnix*, which is named above, was the first steam vessel to make an ocean voyage, having sailed by sea from New York to Philadelphia. The first steam vessel to cross the ocean was the American side-wheel steamer *Savannah*, which left Savannah on May 24, 1819, for Liverpool, where it arrived June 20th, having exhausted its coal after 12 days' steaming; Moses Rogers, who commanded the *Clermont* on its trial trip, was the commander of the *Savannah*. It was ten years after the *Savannah's* voyage before the feat was again attempted, and twenty years before seagoing steamships were regularly used. The most important steamship line that has been opened between Philadelphia and Transatlantic ports is the American Steamship Company's line, which was established in 1873. Four iron steamships were built for this company in 1873 by Wm. Cramp & Sons of Philadelphia, and they are the only line of passenger steamships plying between the United States and Europe wholly owned by Americans. Liverpool and Antwerp are the only Transatlantic ports connected with Philadelphia by regular lines of steamships, but all the principal cities on the Atlantic Coast of the United States are thus connected with Philadelphia.

Large numbers of steamboats now ply on the waters of the Delaware, Schuylkill, Ohio, and other rivers. The Delaware is thus navigated to Trenton, where ascending navigation is impeded by rapids. In 1852 an effort was made to run light draft steamboats to Easton, but, though the trip was accomplished, the passage was found to be so difficult that no further efforts in that direction were made. The dams on the Schuylkill are in a few cases supplied with steamboats of small size and limited capacity. A few pools on the Susquehanna are supplied with small steamboats, but the greater part of that large river, commencing a very short distance from the head of Chesapeake bay, is too shallow for vessels of the lightest draft. In 1825 an effort was made to navigate the Susquehanna by steam. A small stern-wheel steamboat was built at York Haven by Davis, Gordon & Co., and called the *Codorus*. It made four miles an hour against the current. In 1826 it went up the Susquehanna to Binghamton and returned, but it encountered so much trouble that the trip was not repeated. Subsequent efforts by other parties resulted in disaster. On the Monongahela river steamboats are used to the head of slackwater navigation at New Geneva. On the Allegheny river they ascend to Oil City. The Ohio river is traversed by steamboats its entire length, except at seasons of the year when it is frozen over or there is a scarcity of water.

The Introduction of Canals.—While the population was sparse, and roads were few and bad, it was natural that efforts should be made to improve the condition of the rivers of the State so that water transportation could be made in the highest degree available. In 1761 an act was passed by the Legislature appointing commissioners to receive subscriptions toward improving the Schuylkill river, but nothing of consequence was achieved: in 1773 and 1781 other fruitless efforts were made in the same direction. In 1771 an act was passed for the improvement of the Lehigh, followed by other acts every few years from 1791 to 1816, but though a considerable sum of money was expended nothing important was accomplished. In 1789 the Legislature inaugurated a policy of assisting internal improvements undertaken, by passing an act appropriating £10,000 annually for "a fund for claims and improvements, opening roads, improving navigation, and encouraging domestic manufactures."

As early as 1762 it was proposed to connect the waters of Lake Erie and the Ohio with those of the Delaware by the improvement of the rivers, convenient portages, and intermediate canals. Lytle's *History of Huntingdon County* states that the movement had progressed so far that the Juniata river, which was to be part of the route, was authorized to be made navigable by act of March 9, 1771, but no work was done on it. In prosecution of the great conception, Dr. Rittenhouse and others surveyed and leveled a route for a canal between the waters of the Susquehanna and Schuylkill rivers, by means of the Swatara and Tulpehocken creeks, and the Schuylkill and Susquehanna Navigation Company was incorporated to construct it September 29, 1791. A second company, the Delaware and Schuylkill Navigation Company, was organized under an act passed April 10, 1792, to construct a canal along the Schuylkill river from Norristown to

Philadelphia and across that city to the Delaware, with the intention of enabling it to effect a connection with the Susquehanna Canal by the temporary improvement of the Schuylkill river between Norristown and Reading; this canal was also intended to supply Philadelphia with water, and for that reason was to be run the whole distance without any locks, except at its terminal point at Norristown and between the Philadelphia reservoir and the Delaware. In a sketch of Montgomery county, in Egle's *History of Pennsylvania*, Morgan R. Wills claims that on the river bank at Norristown the spade was set to excavate the first public canal in the United States. About fifteen miles of the most difficult part of the work were nearly finished when, through financial difficulties, both companies were compelled to suspend operations completely. A part of the Delaware and Schuylkill Canal was excavated, on the east side of the Schuylkill river, from near the present Columbia avenue bridge to Broad and Vine streets, in Philadelphia, and on its abandoned bed the rails of the State railroad to Columbia were laid, the ground now being occupied by the Philadelphia and Reading Railroad. Other attempts to cut a canal from the Delaware to the Schuylkill through Philadelphia have been made, notably one about 1830, which was called the Southwark Canal. An excavation for this canal was made in the southern part of the city, not far from Moore street, which extended from the Delaware nearly to Broad street, but it was not completed, resulting in failure in common with all other attempts to accomplish the same object.

The Conewago Improvement.—In April, 1793, the Conewago Canal Company was authorized "to open and improve the navigation of the Susquehanna river from Wright's ferry to the mouth of the Swatara." They immediately began and soon finished the projected improvement, which consisted of a short canal, one and one-fourth miles long, around the west side of the Conewago falls in the Susquehanna river, overcoming an impediment to the free navigation of that stream. The canal had a fall of twenty-one feet, and cost $100,000. In 1813 an act was passed authorizing James Hopkins, of Lancaster county, to construct a canal for the same purpose on the east side of the Susquehanna at the Conewago falls. Two dams were built in 1814, and a canal one mile long was excavated. The fall was twenty-one feet, overcome by one guard lock and three lift locks, each 110 feet long by 18 feet wide. The work cost $120,000. The remains of these canals are still to be seen.

Lessons of the War of 1812.—The imperfections of our facilities for transportation were forcibly demonstrated during the war of 1812, when it was found necessary to move troops and their supplies from the Atlantic Coast to the Lakes, for the defense of the frontier, or to send them from point to point throughout the other portions of the country which were from time to time threatened by the enemy. In Colton's *Life of Henry Clay* it is stated that a "Southern Planter" in his *Notes on Political Economy* asserted that, of the $160,000,000 which the war cost, one-half, or $80,000,000, was incurred for transportation. In supplying the forces on the Canadian frontier, every barrel of flour cost $50, every barrel of pork $80, and every cannon used there cost twice as much for its transportation as the cost of making it. For many years John Quincy Adams, Henry Clay, and John C. Calhoun were prominent advocates of internal improvements by the General Government. Although they failed in committing the Government to the support of such a policy, yet public attention was doubtless more strongly directed to the improvement of the means of transportation by the efforts of these able men than it would have been without them. Several States at once commenced the construction of canals after the war of 1812, in some cases private enterprise being aided by the efforts of the State governments. Private corporations began the work in Pennsylvania.

The Schuylkill Navigation Company.—This company was incorporated March 8, 1815, and its canal was completed along the Schuylkill river from Philadelphia to the mouth of Mill creek, at Port Carbon, in Schuylkill county, in 1826. The construction of this canal was hastened by the necessity for some efficient means of transporting coal from the Schuylkill region to tidewater at Philadelphia. It is 108¼ miles long; there are on its line, 71 locks, 121 bridges, 22 culverts, 31 dams, 12 aqueducts, 47 waste-wiers, and 2 overflows. The minimum width of the canal at the top is 60 feet, and at the bottom 40 feet; its depth is 6 feet. Frederick Fraley of Philadelphia is president, and the Philadelphia and Reading Railroad Company is the lessee and operator, having leased the canal in 1870.

The State of Pennsylvania may properly claim the honor of first undertaking the construction of a canal over 100 miles in length, but Massachusetts and New York both opened canals before that of the Schuylkill Navigation Company. Massachusetts constructed two short canals in 1792, together five miles long, at South Hadley and Montague on the Connecticut river, and these are the oldest canals in the United States, though used no longer for navigation purposes but only for power to run manufactories. The Champlain Canal in New York, from Albany to Lake Champlain, was opened in 1823, and the Erie Canal, from Albany to Buffalo, in 1825.

The Lehigh Coal and Navigation Company.—In 1818 the Legislature of Pennsylvania granted the privileges of an "act to improve the navigation of the river Lehigh" to Josiah White, George F. A. Hauto, and Erskine Hazard. On August 10, 1818, they formed a company, the Lehigh Navigation Company, to undertake the work, which was immediately commenced. On April 21, 1820, the Lehigh Coal Company, which had been organized by the same gentlemen to mine coal near Mauch Chunk, was amalgamated with the Lehigh Navigation Company, and the new organization was called the Lehigh Navigation and Coal Company, changed in 1821 to the Lehigh Coal and

Navigation Company. In 1820 the navigation was temporarily completed, and coal arks were sent down the Lehigh and the Delaware to Philadelphia. It was navigable for descending boats only. Dams were constructed, in which sluices were built, and these sluices were opened for the passage of boats whenever a sufficient body of water had accumulated in the dam to flood the stream below and make it deep enough to float the boats or arks to the next dam. This plan was adopted on account of its comparative cheapness, as the river descended very rapidly and at times its bed contained a very small stream of water, thus rendering a canal an expensive undertaking. The boats used were square boxes or arks, from 16 to 18 feet wide, and 20 to 25 feet long. At first, two of these arks were joined together by hinges to allow them to bend up and down in passing the dams and sluices, but, as experience was gained and improvements were made, the number of such sections increased until at last boats 180 feet long were used. They were steered with long oars. These boats were built of lumber cut on the Lehigh, made but one trip to Philadelphia, were then broken up and the planks sold for lumber, the iron work being returned to Mauch Chunk by land. The boatmen walked back for the first two or three years, after which rough wagons were placed upon the road for them at low fares. Coal was at first conveyed in wagons from the mines, nine miles from Mauch Chunk, but the quantity of coal mined each year increased so rapidly that in January, 1827, the construction of a railroad was begun and in May of the same year it was completed, being laid on the turnpike that had until then been used. Loaded cars ran down this railroad to Mauch Chunk by gravity, and were drawn back to the mines by mules.

About midsummer, 1827, the construction of a canal to take the place of the temporary navigation was commenced under the direction of Canvass White, engineer, and it was completed from Mauch Chunk to Easton in June, 1829. At Easton this canal was intended to connect with the Delaware division of the Pennsylvania Canal, extending from Easton to Bristol, 20 miles from Philadelphia, but this division was not completed until nearly three years after the Lehigh Canal, and the use of arks had to be continued until that time. In October, 1835, the canal was completed to White Haven, 72¼ miles from Easton, and in 1838 a descending navigation was extended from White Haven to Stoddartsville, 12¼ miles farther, making the total length of navigable water on the Lehigh river 84½ miles. There were 78 locks and 31 dams on the line, overcoming 1296¾ feet of lockage, the height of the dams ranging from 6 feet to 58 feet. The canal was 60 feet wide on the surface and 5 feet deep, and the locks were 100 feet long by 20 feet to 22 feet wide, making lifts of 6 feet to 30 feet.

In 1837 a railroad was commenced from White Haven to Wilkesbarre, 19¾ miles, there to connect with the North Branch Canal, and to tap the coal trade of the Wyoming region. Three inclined planes were located on the line, with stationary engines. It was opened in 1840, and was afterwards extended east to Phillipsburg, New Jersey, and west to Union Junction, making its length 105 miles in 1876, with 47.35 additional miles in branches. The inclined planes are still used. The Delaware Division Canal was leased in 1866 by this company. In 1871 the Central Railroad of New Jersey leased the company's property in perpetuity. The present president of the Lehigh Coal and Navigation Company is E. W. Clark of Philadelphia.

The Conestoga Navigation Company.—Gordon's *Gazetteer* states that the Conestoga Lock and Dam Navigation Company was chartered in 1806, and the Conestoga Navigation Company in 1825, and *Appleton's Cyclopædia* says that in 1826 the Conestoga river was made navigable by dams and locks from Lancaster to Safe Harbor, on the Susquehanna river, a distance of 19 miles. Nine dams and locks were built on this improvement, but no canals were dug, the navigation consisting entirely of slackwater. The locks were 100 feet long by 22 feet wide. Navigation has now ceased, and the dams furnish power for mills.

The Codorus Navigation Company.—Gordon's *Gazetteer* states that this company was chartered in 1825, and immediately began the construction of an improvement of the Codorus creek from the Susquehanna river to York, a distance of 11 miles. Of this distance 3 miles consisted of canal and 8 of slackwater. There were 9 dams and locks. This improvement is no longer used.

The Union Canal Company.—In 1811 this company was chartered to succeed the Schuylkill and Susquehanna and the Delaware and Schuylkill companies, but it did not get to work until 1821, the State in the meantime authorizing it to raise funds by lotteries, of which it was given the monopoly. In the meantime the Schuylkill Navigation Company was organized to improve the Schuylkill river navigation, and in 1821 the operations of the Union Canal Company were confined to the opening of a canal from Middletown on the Susquehanna to Reading on the Schuylkill. In 1827 the canal was rendered navigable. The *Alpha*, of Tulpehocken, was the first boat to pass over it. Its length is 77⅔ miles. On its line there are 93 locks, 1 tunnel, 74 wastewiers and overflows, 78 bridges, 31 culverts, 16 dams, and 16 aqueducts. The surface of the canal is 43 feet wide and its depth is 4½ feet. The locks are 132 feet long by 17 feet to 19 feet wide. The president of the company is T. C. Zulick of Schuylkill Haven.

The Delaware and Hudson Canal Company.—This company was chartered by the Legislature of New York, April 23, 1823, to construct a canal and railroad from the coal fields of Pennsylvania to the Hudson river at Rondout, New York. The canal was completed in 1828. It lies partly in New York and partly in Pennsylvania. Commencing at the mouth of Rondout creek on the Hudson river, in

New York, it extends 83 miles to the mouth of the Lackawaxen on the Delaware river, where it enters Pennsylvania, and passing up twenty-five miles terminates at Honesdale, in Wayne county, 108 miles from its commencement. At Honesdale the canal connects with a railroad 16 miles long, finished in 1829, which extends to the coal mines at Carbondale, Luzerne county. Upon this railroad the first locomotive in America ran on August 8, 1829, of which a description will be found accompanying the sketch of the railroads of the State. On the line of this canal there are, 132 locks, 110 waste-wiers, 10 overflows, 136 bridges, 31 culverts, 40 dams, and 22 aqueducts. The surface width of the canal is 48 feet and the depth is 6 feet. The locks are 100 feet long by 15 feet wide. Thomas Dickson of Scranton and New York is president of the company.

In 1831 it was stated by Gordon's *Gazetteer* that 43 joint-stock canal and navigation companies had been incorporated, of which only seven had constructed canals or improved rivers, as enumerated above. When Stephen Girard died, in 1831, his will contained a bequest of $300,000 to the State of Pennsylvania, to be expended in improving the navigation of the rivers by the construction of canals. At this time, however, the State had inaugurated an extensive system of internal improvements, of which a brief sketch is hereafter given.

The Susquehanna Canal Company.—This company was chartered on April 15, 1835, and its canal was opened for navigation in 1840. It extends 45 miles, from Columbia, Pa., to Havre de Grace, Md., 30 miles of its length being in Pennsylvania. On its line there are 43 locks, 4 dams, 5 culverts, 18 bridges, 33 waste ways and wiers, and 6 aqueducts. The surface width of the canal is 50 feet, and its depth is from 5½ feet to 6 feet. The locks are 170 feet long and 17 feet wide. G. A. Nicolls of Philadelphia is president of the company. The Philadelphia and Reading Railroad Company is lessee and operator, having leased the canal January 2, 1872.

The Monongahela Navigation Company.—The immense coal deposits in the Monongahela valley caused attention to be drawn very early to the navigation of the Monongahela river. The "broadhorn," a species of ark, was first used, and in such boats coal was sent down the river whenever floods swelled its volume and increased its depth so that bars and ripples presented no impediment. These boats were broken up at their destination and were not brought back up the river. Keel boats then came into use, when the demands of commerce had made it necessary to supply means of ascending the stream as well as descending it. They were pushed up the stream by poles or drawn by horses walking on the bank. At length the improvement of the river became a necessity to supply the demands of an ever-growing trade which could not be dependent on floods or freshets.

The History of the Monongahela Navigation Company, published in 1873, states that the earliest known suggestion of an improvement in the navigation of the Monongahela by locks and dams was in a report of a survey made for the State by E. F. Gay, engineer, in 1828. Nothing was done, however, until 1832, when Andrew Stewart, then a member of Congress, made an effort to have the work undertaken by the United States as an extension, under the act of 1824, of the improvement of the navigation of the Ohio to the National road at Brownsville. Congress provided for a survey of the Monongahela to Brownsville, which was made in 1833 by Dr. William Howard, United States civil engineer. The plan he suggested was to construct locks and low dams, 8 in number, the first of 6-foot lift, and the others of 4½-foot; the intention being to use them only when the river was low, thus making a slackwater navigation. Congress having declined the undertaking, a public meeting was held at Waynesburg, Greene county, November 18, 1835, to urge the improvement by the State. Other meetings in the vicinity and at Pittsburgh warmly seconded the movement. The State did not itself assume the prosecution of the work, but in the legislation obtained it promised substantial assistance. On March 31, 1836, the Monongahela Navigation Company was authorized to make a slackwater navigation from Pittsburgh to the Virginia line, now West Virginia, and as much farther as Virginia would allow it to go. The height of the dams was not to exceed 4½ feet. The design which was carried out was to deepen the stream for navigation by the erection of dams, and to build locks to enable boats to pass the dams, but not to cut a canal along the river. On February 10, 1837, the company was organized. The Legislature required the United States Bank, chartered February 18, 1836, to subscribe $100,000 to the company's stock, $50,000 at the opening of the books, and $50,000 when $100,000 from other sources had been expended on the work. In 1838 the State subscribed $25,000 and in 1840 $100,000 more. When the company began its work, in 1837, the citizens had subscribed $83,100.

In 1838 a survey was made by W. Milnor Roberts, with Nathan McDowell and Robert W. Clarke as assistants. It was found that the distance to the Virginia line was 90½ miles, and the ascent 74½ feet, requiring 17 dams of 4½ feet lift. In 1839 the Legislature authorized 8-foot dams, and afterwards permitted them to be even higher if necessary. Dam No. 1, 8 feet high, was located one mile above the Smithfield street bridge at Pittsburgh; No. 2, 8 feet high, ten miles above No. 1. Dam No. 1 was let to J. K. & J. B. Moorhead December 17, 1838. From that time the work of construction continued progressively until 1842, when the United States Bank failed, carrying financial disaster to the company. Dams Nos. 1 and 2 and their accompanying locks were put into use October 18, 1841. Dam No. 3, 8 feet high, located 14 miles above No. 2, and dam No. 4, ten feet high, located 15 miles above No. 3, were let in 1840, but were unfinished when the crisis came. In 1843 the stock of the State was sold to James K. Moorhead, Morgan Robertson, George Schnable, Charles Avery, Thomas M. Howe, John Graham, Thomas Bakewell, J. B. Moorhead, and John Freeman, who engaged to complete the work to Brownsville. In July, 1844, they set to work on dams Nos. 3 and 4, and of November 13, 1844, the river was slackwatered to Brownsville by the completion of dam No. 4, 15½ miles below the town.

In the same year, 1844, the Baltimore and Ohio Railroad was completed to Cumberland, Md., and the National road, which extended thence through Brownsville, was an inviting route to travelers who wished to reach the head of navigation on the Monongahela to continue their journey. For eight years, until the Pennsylvania Railroad was opened through to Pittsburgh, the Monongahela Navigation Company reaped a harvest. "The National road was literally crowded with stage coaches and wagons." In 1850 the slackwater carried 18,379 stage passengers.

Dam No. 5, 13½ feet high, located 17½ miles above No. 4, and two miles above Brownsville, and No. 6, 14 feet high, located 10 miles above No. 5, were by act of January 25, 1854, ordered to be built by the State, and they were completed in November, 1856. Other dams farther up the river are contemplated, but have not yet been undertaken.

The length of the slackwater from dam No. 1, one mile from Pittsburgh, is 85 miles to the present head of navigation at New Geneva in Fayette county. The locks are all built of cut stone. Six of them are 190 feet long by 50 feet wide in the chamber, and two are 250 feet by 56 feet. Steamboats, barges, and flats are used by the boatmen on the Monongahela, who pay toll to the company for the use of the navigation. Coal and coke form the greater part of the freight moved over it, but it does a vast miscellaneous business, even including the conveyance of passengers. In the year ending December 31, 1876, there were 10,524 through passengers and 33,135 way passengers conveyed over it. In the same year 62,395,000 bushels of coal and coke were shipped by this route. This business has improved wonderfully since 1844, in which only 737,150 bushels of coal and coke were shipped. J. K. Moorhead of Pittsburgh has been president of the company since July, 1846.

The Muncy Canal Company.—This company was incorporated in 1848, and has constructed a canal three-fourths of a mile in length, from the town of Muncy, Lycoming county, to the West Branch division of the Pennsylvania Canal. It was opened for navigation in 1849. Its surface width is 40 feet and its depth is 4½ feet. Its president is Joseph E. Riebsam of Muncy.

The Pennsylvania Canal Company.—This company was incorporated in 1866, being an organization originated by the Pennsylvania Railroad Company for the management of its canals. It now owns nearly all the canals which the State built along the Susquehanna river and its branches, the only exception being that part of the North Branch canal that extends from Wilkesbarre to the State line, which is owned by the Pennsylvania and New York Canal and Railroad Company, but is not now operated. The Eastern division of the canal, from Columbia to Duncan's Island, and the Juniata division, from Duncan's Island to Hollidaysburg, both of which had been purchased from the State in 1857, were sold by the railroad company to the canal company immediately upon its formation in 1866; the Wyoming Canal, from Northumberland to Wilkesbarre, was merged into the Pennsylvania Canal in 1869; the Wiconisco Canal, from Duncan's Island or Clark's Ferry to Millersburg, was acquired in 1871; and the Susquehanna and West Branch canals, from Duncan's Island to Farrandsville, were purchased October 14, 1873. That portion of the Juniata Canal lying west of Petersburg, Huntingdon county, was abandoned in September, 1874. The remainder of these canals, embracing a total length of 338 miles, are still in use, and the system, having Columbia as its base, reaches to Petersburg, Huntingdon county, in the west; to Farrandsville, Clinton county, in the northwest; and to Wilkesbarre, Luzerne county, in the northeast. Full descriptions of these canals are hereafter given in the sketch of the State Line of Canals and Railroads. Short canals extend from the main line to Lock Haven, Lewisburg, and Millersburg, tapping Lykens valley at the latter place. A short canal also extends to Muncy, but it is owned by the Muncy Canal Company. The president of the Pennsylvania Canal Company is Isaac J. Wistar of Philadelphia.

Canal Inclined Planes.—On all the canals in Pennsylvania boats are lifted from level to level by locks. On only one canal in the United States lifts are made by inclined planes. The following description of this method is taken from *Johnson's Cyclopædia:*

> On the Morris and Essex Canal in New Jersey there are only a few locks, most of the lifting being done by inclined planes, of which there are 23, with an average lift of 58 feet each. These planes are used as follows: A railway is laid on the plane down to and under the water in the lower level. When a boat is to be raised a car is lowered into the water, and the boat, being floated over it, is then made fast to the car. A stationary steam engine then draws the car by means of a chain to the top of the inclined plane, at which there is a lock having gates at both extremities. After the car has entered the open gates they are closed after it, and, the gates next to the canal being opened, the water flows in and floats the boat off the car. Its place is supplied by a boat coming in the opposite direction which enters the lock and is adjusted over the car, when the water is run off and it grounds on the car. The gates near the plane are then opened, the car is lowered to the bottom, and the boat again floats.

Existing Canals.—The following canals are now in operation in Pennsylvania: Delaware and Hudson, from Honesdale to the State line, 25 miles; Delaware division, 60 miles; Lehigh Coal and Navigation, 48 miles; Monongahela Navigation, 85 miles; Muncy, 0.75 mile; Pennsylvania, 338 miles; Schuylkill Navigation, 108.23 miles; Susquehanna, 45 miles; Union, 77.64: total, 787.62 miles. About 1,000 miles of canal and slackwater navigation have been constructed in Pennsylvania, but one-fourth of the total length has been abandoned.

The State Line of Canals and Railroads.—The people of New York, Pennsylvania, Maryland, and Virginia were early imbued with a desire to connect the western part of their territories with the eastern part by a line of water communication which would render travel easier and less expensive than by land vehicles. *Hazard's Register* says that about 1769 the Pennsylvania Provincial Legislature ordered a route for an inland communication to be surveyed from Philadelphia to Pittsburgh and Erie. The survey was made, and a report was submitted strongly recommending the construction of a canal, to be 582 miles long. General Washington was deeply interested in the question of opening lines of communication with the interior. He advocated several routes from the seaboard to the Great Lakes, and was a prominent advocate of the improvement of the Virginia rivers. He was the first president of the James River and Kanawha Canal Company, which was organized in 1785, and was intended to connect the seaboard with the Ohio valley, but the scheme has not to this day been fully carried out; the canal extends through the eastern part of Virginia from Richmond to Buchanan, in Botetourt county, west of the Blue Ridge. Work was first commenced on it in 1836; an extension west from Buchanan is now partly finished for about forty miles. New York began the construction of the Erie Canal in 1817, and opened it for navigation in 1825. The Pennsylvania Canal was commenced on July 4, 1826, and completed in 1833, but the Columbia Railroad, the link between the Susquehanna river and Philadelphia, was not completed until 1834. The Chesapeake and Ohio Canal, which was the result of the joint efforts of Maryland and Virginia, intended to connect Georgetown, D. C., with Pittsburgh, was projected very early, General Washington having been first president of it as well as of the James River Canal. It was, however, constructed between 1820 and 1850, having reached its present and apparently permanent terminus, Cumberland, Maryland, in the latter year.

First Practical Legislation in Pennsylvania.—The first legislative action toward the accomplishment of the successful scheme of internal improvements in Pennsylvania was the appointment of a committee of the Legislature to consider the advisability of establishing a line of communication with the West. On the 10th of February, 1824, the committee made a report recommending a survey along the valleys of the Susquehanna, Juniata, Conemaugh, Kiskiminetas, and Allegheny rivers, with a view to a continuous canal from Philadelphia to Pittsburgh. An act was passed on the 27th of March, 1824, providing for the appointment by the Governor of three commissioners who were directed to make an investigation and determine the practicability of water communication between the Schuylkill and the Susquehanna, and between the Susquehanna and the Ohio rivers. A navigable route from Philadelphia to the Susquehanna river was in course of construction by way of the Schuylkill Navigation to Reading, and the Union Canal thence to Middletown on the Susquehanna, but both lines were in the hands of private companies. On the 31st of March, 1824, as set forth in the reports of the canal commissioners of Pennsylvania, from which most of these facts have been obtained, Governor John Andrew Shulze appointed Jacob Holgate, James Clarke, and Charles Treziyulney commissioners to inquire into the expediency of the proposed undertaking. They met at Lebanon on April 16th. After many unsuccessful efforts to engage a skillful engineer, they employed some surveyors, and in May began to explore the routes. From May to July was spent in examining the country from the Schuylkill river to the Susquehanna, and from September to November was occupied in surveys up the Allegheny and Conemaugh rivers, over the Allegheny mountains, and down the Juniata and Susquehanna rivers to Harrisburg. In their report they recommended this route, and suggested the piercing of a tunnel for a canal through the Allegheny mountains. They described a tunnel in the report referred to as "a passage like a large well dug horizontally through a hill or mountain." A passage entirely by water was suggested, and a railroad was not then thought of, such as was afterwards built over the Alleghenies. The plan proposed was to build a series of locks on each side of the mountains, to elevate the boats to a certain altitude, at which point the tunnel referred to was to connect the water in the highest lock on the eastern side with that in the highest lock on the western side. The length of the tunnel was estimated at four miles. Their principal surveyors were Mr. Siddal and Mr. John Thom.

Under another act passed April 11, 1825, five commissioners were appointed to make further surveys. They were John Sergeant, president, Wm. Darlington, Abner Lacock, David Scott, and Robert M. Patterson. They were directed to examine the routes along the Susquehanna, West Branch, Sinnemahoning, Clarion, and Allegheny rivers to Pittsburgh; up the Allegheny river and across to Erie; up the Juniata, across the Alleghenies, and down the Conemaugh, Kiskiminetas, and Allegheny rivers to Pittsburgh; up the North Branch of the Susquehanna from Northumberland to the New York State line; by way of the Conewago and Conococheague or Monocacy to the Potomac; through Cumberland and Franklin counties to the Potomac; and through Bedford county to connect the Juniata valley with the proposed Chesapeake and Ohio Canal. In August, 1825, a convention of citizens, comprising delegates from forty-six counties, was held at Harrisburg to urge the completion of a system of internal improvements, and on February 25, 1826, an act was passed providing for the commencement of a canal, to be constructed at the expense of the State, from Middletown, the terminus of the Union Canal, to the mouth of the Juniata, and from Pittsburgh to the mouth of the Kiskiminetas. This was the signal for the vigorous prosecution of the work. Other acts were subsequently passed which located numerous routes, all over the State, and if they had been carried into effect every part of Pennsylvania would have been amply provided with facilities for transportation. The following divisions of the great enterprise, however, were the only ones completed: Delaware division, from Bristol to Easton; Philadelphia and Columbia Railroad; Eastern division, from Columbia to Northumberland; North Branch division, from Northumberland to New York State line; West Branch division, from Northumberland to Farrandsville; Juniata division, from the mouth of the Juniata river to Hollidaysburg; Allegheny Portage Railroad, across the Allegheny mountains from Hollidaysburg to Johnstown; Western division, from Johnstown to Pittsburgh; Beaver division, from the mouth of the Beaver river to six miles above New Castle; Erie extension, from the northern end of the Beaver division to Erie. In several localities short branches were constructed from the above-named canals either to supply them with water or to extend navigation facilities to towns a short distance from the line.

The Commencement of the Work in 1826.—On the 25th of February, 1826, as before stated, the Legislature authorized the commencement of work on the canal. It appropriated $300,000 for the portion of the work which it then directed to be done, namely, from the terminus of the Union Canal at Middletown on the Susquehanna to the mouth of the Juniata, and from Pittsburgh to the mouth of the Kiskiminetas. The Legislature having authorized the Governor to appoint four more commissioners so that the board should number nine, he named Thomas Enoch, John Phillips, Charles Mowry, and George M. Dallas. They elected Wm. Darlington president, and Joseph McIlvaine secretary. General Abner Lacock and Charles Mowry, members of the board, were appointed acting commissioners to represent the board, General Lacock to supervise the Western division of the canal, and Mr. Mowry the Eastern. William Strickland was appointed engineer in the service of the board on the 10th of March. He commenced work on the canal from Middletown at the mouth of the Swatara river, to extend up the Susquehanna through Harrisburg to Duncan's Island at the mouth of the Juniata. Contracts for this work were made in June, 1826, and on the Fourth of July following the first ground was broken near Harrisburg for the State system of internal improvements. Canvass White, engineer, assisted on the Eastern division. Nathan S. Roberts and Major D. B. Douglass were appointed engineers for the

Western division. In this year 22½ miles of the Eastern division and 24 miles of the Western were put under contract. Surveys were continued in various parts of the State in the location of routes.

Progress in 1827.—Judge David Scott was appointed president of the board in 1827 and Joseph McIlvaine re-appointed secretary. On March 14th the corner stone of the first canal lock was laid at Harrisburg, in lock No. 6. It was stated on December 25, 1827, that 162½ miles of additional canal were at that time under contract, having been authorized by the Legislature on April 9th. This embraced portions of the Western division, Eastern division, French Creek feeder, Juniata division, Susquehanna division, and Delaware division. Two of these divisions were separate from the projected main stem which was to extend from Philadelphia to Pittsburgh—the French Creek feeder, intended to convey a supply of water for the Erie Canal, extending along French creek in Crawford county, and the Delaware division, extending along the Delaware from Bristol to Easton. Among the engineers employed by the board in 1827 were William Strickland, James Geddes, N. S. Roberts, Canvass White, John Bennet, and George T. Olmsted.

Progress in 1828.—In 1828 Daniel Montgomery was elected president by the board, which consisted of himself, David Scott, Thomas Enoch, Charles Mowry, John Sergeant, Jonathan Roberts, Abner Lacock, John Phillips, and James Clarke. On August 21st Thomas Enoch resigned and Mr. Hammond was appointed in his stead. Joseph McIlvaine was re-appointed secretary at a salary of $2,000 per annum. In March of this year water was first let into the canal at Harrisburg. Charles T. Whippo surveyed the North Branch division from Northumberland to Nanticoke Falls near Wilkesbarre; Francis W. Rawle surveyed the West Branch division from Northumberland to Dunstown near Lock Haven; Major John Wilson surveyed the railroad route from Philadelphia to Columbia; N. S. Roberts and Moncure Robinson surveyed the Allegheny Portage Railroad route from Hollidaysburg to Johnstown; Wm. R. Hopkins surveyed a railroad route from Columbia to York, Gettysburg, and Chambersburg; Edward F. Gay surveyed the Monongahela river from Pittsburgh to Brownsville; Moncure Robinson surveyed a route for a canal from the Lehigh to the North Branch. On December 9, 1828, the board authorized advertising for proposals for the construction of 40 miles of the roadbed of the Philadelphia and Columbia Railroad, 20 miles to be prepared at each end. The entire length of the railroad was to be 81 miles.

Progress in 1829.—In 1829 the Legislature assumed the appointment of the commissioners. Their names were David Scott, president, John Mitchell, Peter S. V. Hamot, James S. Stevenson, James Clarke, Robert M. Patterson, John Forrey, Nathaniel B. Eldred, and David Frazier. Francis R. Shunk, afterwards Governor, was appointed secretary at a salary of $1,000 a year. The State works were placed in charge of the following officers: Juniata division, James Clarke, acting commissioner; Western division, James S. Stevenson, acting commissioner; Eastern division, John Forrey, acting commissioner; North Branch division, John Mitchell, acting commissioner; Susquehanna and West Branch divisions, John Ryon, Jr., superintendent; Delaware division, Thomas G. Kennedy, superintendent; Columbia Railroad, John Barber, superintendent. Francis W. Rawle was appointed engineer of the Susquehanna and West Branch divisions, and Sylvester Welch and Moncure Robinson were appointed engineers of the Western division. Up to December 18, 1829, there were in all 428½ miles of canal under contract, as follows: Pittsburgh to Johnstown, 104 miles; mouth of the Juniata (Duncan's Island) to Smith's mills, above Huntingdon, 90 miles; Middletown to Muncy hills, including the Columbia line 10 miles from Middletown to Columbia, 100 miles; Northumberland to Nanticoke Falls, North Branch, 55 miles; Bristol to Easton, 60 miles; Bemus's mills on French creek to Muddy run, Crawford county, 19½ miles. Of the foregoing, 195 miles were navigable, as follows; Pittsburgh to Blairsville, 75 miles; Duncan's Island to Lewistown, 45 miles; Middletown to Clark's Ferry, 24 miles; Duncan's Island to Northumberland, 41 miles; French Creek feeder, 10 miles. Of the whole length under contract 15½ miles were let in 1829. The money expended thus far amounted to $6,406,000. In December Moncure Robinson made a report of his survey for the Allegheny Portage Railroad over the Allegheny mountains, in which he proposed to use ten inclined planes and a tunnel on the route. James Ferguson explored a course for a canal from Pittsburgh to Erie.

Progress in 1830.—In 1830 the number of commissioners was reduced to three. Governor George Wolf appointed James S. Stevenson, James Clarke, and John Mitchell. They elected James S. Stevenson president, and Francis R. Shunk secretary. Their report for 1830 stated that the length of the main line of canals and railroads to extend from Philadelphia to Pittsburgh would be 397 miles, of which 210 were completed; 3½ miles were put under contract in 1830. Of the railroad from Philadelphia to Columbia, 40½ miles were ready for the rails; the Western division was opened to Johnstown on December 10th; the Juniata division was navigable to Huntingdon; the Susquehanna division was navigable its whole length, from Duncan's Island to Northumberland; the West Branch division was opened in November to the Muncy ripples, 24½ miles from Northumberland; the North Branch division was completed to Nanticoke Falls, 55½ miles from Northumberland, in November, but was not entirely navigable; the Delaware division was filled for navigation in October, but, owing to an engineering blunder in attempting ot supply its whole length with water from the Lehigh river at Easton, only 25 miles of it were found to be navigable; the French Creek feeder was completed 19½ miles, from Bemus's mill to Muddy run, and water was let in from a few small streams, but, having no connection with French creek, along which it ran, the canal could not be put to use. The commissioners recommended the improvement of the Monongahela river and the establishment of a line of water communication with Erie by way of the Beaver and Shenango rivers or the Allegheny.

Progress in 1831.—In 1831 James Clarke was president of the board; and Francis R. Shunk secretary. Moncure Robinson and Col. Stephen H. Long both presented reports of routes surveyed for the Portage Railroad, but the commissioners appointed Sylvester Welch to take charge of that work. He surveyed the route in 1831, having Solomon W. Roberts as his first assistant on the western slope and W. Milnor Roberts on the eastern. The work of construction was begun on the western slope in April, 1831. On the 18th of May a single track of the Columbia Railroad was contracted for, to extend 12½ miles from Columbia. On the 20th of July the Beaver division, from the Ohio river at Beaver to New Castle, 24¾ miles, was put under contract. The total length of new work put under contract in 1831 was 267 miles.

Progress in 1832.—In 1832 the previous organization of the board continued. A single track was finished, except a bridge over the Schuylkill river, from Philadelphia to the junction with the West Chester Railroad, about 22 miles, and cars or "stages" pulled by horses first ran over it on September 20, 1832; it was open for business on October 18, 1832.

Opening of the Main Line in 1834.—The report for 1833 states that 711½ miles of railroad and canal had been put under contract from 1826 until that time In 1834 the commissioners announced that 600 miles of canal and 120 miles of railroad were finished, and that the main line was open for business. A single track of the Portage Railroad had been opened November 20, 1833. On April 16, 1834, the line was completed, the Columbia Railroad, which was the last link, having been finished on that day. The length of the main line from Philadelphia to Pittsburgh in 1856 was 400.44 miles, instead of 397 miles, as estimated in 1830. The Beaver division was opened for business May 28, 1834, and the North Branch division July 4th. Freight from Philadelphia to Pittsburgh at first occupied eight days in transit and cost $1 per 100 lbs.; from Philadelphia to Cincinnati, by way of the Ohio river, required twelve days, and cost $1.30 per 100 lbs.; cotton was carried from Tennessee to Philadelphia by way of the Ohio river and the Pennsylvania line for $1.12½ per 100 lbs.; flour was transported from Pittsburgh to Philadelphia for $1.12½ per barrel. Stevenson's *Civil Engineering of North America* says that in 1837 "the passenger boats were dragged by three horses at once, which ran ten-mile stages at from four to four and one-half miles per hour. The whole journey from Philadelphia to Pittsburgh consumed 91 hours, or an average of 4.34 miles an hour, and the fare was $15."

A brief sketch of the circumstances attending the construction and opening of the principal part of the Pennsylvania improvements having thus been given, it will now be followed by descriptions of the separate divisions.

Delaware Division of the Canal.—This division had no connection with any of the other works of the State, but it formed an important outlet for the trade of the Lehigh coal region, by connecting with the Lehigh Coal and Navigation Company's canal at Easton. It extended from Bristol to Easton, along the Delaware river, a distance of 60 miles. In 1827 it was put under contract, and the filling of the canal for navigation commenced in October, 1830, but only 25 miles were navigable, as there was a scarcity of water. A mistake was committed in endeavoring to procure from the Lehigh river alone a supply of water for the whole length of the canal. Feeders from various streams were then constructed, and a pump operated by a water-wheel was built in 1831 at New Hope to force water into the canal from the Delaware. On June 11, 1832, its whole length was filled with water, but breaches occurred, and not much business was done until the middle of October. From that time the canal was gradually put into good condition and became a very important part of the State improvements. A water connection with New York was accomplished by means of the Delaware and Raritan Canal across the State of New Jersey. Boats left the Delaware Division Canal at New Hope, 15 miles above Bristol, passed across the Delaware river, and entered a feeder to the Delaware and Raritan Canal. At Bristol an outlet lock was constructed, which enabled canal boats to pass into the Delaware river. Steam tugboats towed the canal boats to Philadelphia from Bristol. On the Delaware division in 1856 there were, 2 dams, 28 locks, 10 aqueducts, 16 culverts, 19 overfalls, and 143 bridges. In 1858 the State sold this division to the Sunbury and Erie Railroad Company, who, on July 10, 1858, transferred it to the Delaware Division Canal Company. In 1866 it was leased to the Lehigh Coal and Navigation Company, who leased it to the Central Railroad of New Jersey in 1871. Material improvements have been made on it since its sale by the State. J. W. Woolston of Philadelphia is president of the Delaware Division Canal Company. The report for 1852 states that the first cost of this division was $1,384,606.96.

The Philadelphia and Columbia Railroad.—This railroad, as at first constructed, commenced at Broad and Willow streets in Philadelphia, and ran over the route now occupied by the Philadelphia and Reading Railroad as far as Belmont station, four miles from the starting point, on the Schuylkill river; there it ascended to higher ground by an inclined plane, 2,805 feet long with a rise of 187 feet; thence it proceeded west, following, from White Hall station, the present general route of the Pennsylvania Railroad to Columbia; at Columbia it descended to lower ground by an inclined plane, 1,800 feet long with a fall of 90 feet, and connection was there made with the Eastern division of the canal. Its total length was 81 miles. On this railroad horses were first used, but afterwards locomotives entirely superseded them. At the planes stationary steam engines were always used. As this railroad was part of the main line between Philadelphia and Pittsburgh, and was used in connection with the canal, a large part of the freight was transported in boats built in sections, each section making an independent piece of the boat, which was loaded on wheeled trucks and thus hauled over the railroad without having its contents disturbed. The use of section boats began about 1840.

This railroad was commenced in 1828, after surveys by Major John Wilson, and in 1830 there were 40 miles graded and ready for the superstructure. In 1831 the remaining 41 miles of the road were put under contract. On September 20, 1832, the railroad was completed 22 miles from the top of the Schuylkill plane to the West Chester Railroad junction, and was then first used, but it was not opened for business until October 18th. The West Chester Railroad, nine miles long, was a private enterprise on which horses were also used at first. On December 25, 1833, the track from Philadelphia to the top of the Schuylkill plane was completed. From the West Chester Railroad junction to Columbia, the railroad was opened April 16, 1834. The opening of this railroad completed the line to Pittsburgh, the canals and the Allegheny Portage Railroad having been finished a few weeks before. The track on this railroad was a mixture of edge rails laid in cast iron chairs on stone blocks; granite sills, topped with flat iron bars; and wooden transverse sills and wooden rails, topped with flat iron bars. The report for 1832 gives the cost of these kinds of superstructure, excluding grading, at $10,331.63 per mile for the first named; $11.118.33 per mile for the second; and $5,579.25 per mile for the last. The rails were ordered and rolled in England because there was at that time no machinery in America for their manufacture. For many years the State supplied the motive power on this railroad, and charged toll for passage over the road by cars belonging to individuals or to transportation companies which were formed. When horses were used it is said that each owner of a car drove his own team, and great inconvenience was occasioned when a driver stopped his horses at a place of no importance to those who were following him. A better system was soon adopted, but all trouble was not avoided until the State supplied locomotives which ran at fixed times and stopped at certain places. Locomotives commenced running June 28, 1834, but there was not a sufficient number of them until 1836 or 1837. In his *Pennsylvania Railroad*

Sipes says the first locomotive on this railroad was the *Black Hawk*, which was built in England and was hauled in wagons from Philadelphia to Lancaster and there placed on the track, which had then been completed only between that city and Columbia. This must have been in 1831. But the locomotive was a complete failure. The first locomotive named in the reports is the *Lancaster*, built by M. W. Baldwin, of Philadelphia, which commenced its trips on June 28, 1834. There were twelve locomotives ordered at first: six from M. W. Baldwin, four from Robert Stephenson of England, and two from Coleman Sellers & Sons of Philadelphia. In 1835 there were only seventeen locomotives in use. On July 10, 1836, the Norris Locomotive Works of Philadelphia put a locomotive, the *George Washington*, on this railroad, which climbed the Schuylkill plane and demonstrated the practicability of the use of heavy grades by locomotives. In 1838 successful experiments were made in burning anthracite coal in some of the locomotives. It was found necessary, however, to place a small stationary engine with a four-inch cylinder and an eight-inch stroke on the locomotive to drive a fan for blowing the fire. In 1839 bituminous coal began to be used. On March 4, 1840, the Columbia plane was abandoned, a new railroad having been constructed which dispensed with an inclined plane and a stationary engine. In 1846 repairs on the road were made with T rails. Some were bought at Danville at $80 per ton. In 1850 a telegraph line was built for the use of the railroad. On October 14, 1850, the Schuylkill inclined plane was abandoned, a new road having been built, avoiding the plane, from near the present terminus of the Pennsylvania Railroad, at the western end of the Market street bridge at Philadelphia, intersecting the Columbia Railroad at White Hall station. The abandoned inclined plane can still be seen in West Fairmount Park, Philadelphia, near Belmont Mansion, part of it being used as a bridle path. Some of the large stone blocks to which the cast iron chairs were bolted, which supported the rails, are also to be seen there. The rails used on the new road weighed 60 pounds to the yard, were made at Danville and Phœnixville, and cost $50 per ton. The part of the railroad then abandoned was sold to the Philadelphia and Reading Railroad Company for $243,200. In 1856 a contract was made with the Pennsylvania Railroad Company to carry passengers and freight over the road for five years. In 1857 the State sold the Columbia Railroad to the Pennsylvania Railroad Company, and it became a permanent part of that company's main line. The report for 1852 stated that its original cost was $4,791,548.91.

The Eastern Division of the Canal.—This line of canal connected with the Philadelphia and Columbia Railroad at Columbia, and extended from that point along the Susquehanna river to Duncan's Island at the mouth of the Juniata river, where it intersected the Juniata and Susquehanna divisions. Its length was 47 miles. By the report of 1856 there were on its line, 2 dams, 9 aqueducts, 28 locks, 84 bridges, 16 culverts, 3 overfalls, and 6 waste-wiers. This part of the State works was the first to be commenced. On July 4, 1826, near Harrisburg, ground was first broken for it; on March 14, 1827, the corner stone of the first canal lock was laid in lock No. 6 at Harrisburg; in 1828 water was admitted; and in 1830 this division was completed throughout its whole length. In 1828 the first canal packet boat for the conveyance of passengers built in the State was launched at Lancaster, and named the *Red Rover*. On May 10, 1833, it was taken to Columbia, and Thomas King ran it between Columbia and Middletown. In 1857 this canal was sold to the Pennsylvania Railroad Company, and is now operated by the Pennsylvania Canal Company, which was incorporated in 1866 for the management of the Pennsylvania Railroad Company's canals. It connects at Columbia with the Susquehanna Canal, which extends to Havre de Grace, Maryland, and is operated by the Philadelphia and Reading Railroad Company. The report for 1852 states that the first cost of this division was $1,737,236.97.

The Juniata Division of the Canal.—This line of canal connected with the Eastern and Susquehanna divisions at Duncan's Island, and extended up the valley of the Juniata to Hollidaysburg, where it connected with the Portage Railroad over the Allegheny mountains. It was 132 miles long. The report for 1856 gives it 19 dams, 22 aqueducts, 86 locks, 54 culverts, 22 waste-wiers, 40 overfalls, 127 road and farm bridges, and 7 towing-path bridges. Work on it was begun in 1827. In 1829 the canal was navigable from the Susquehanna river to Lewistown. In 1830 it was navigable to Huntingdon. In 1833 it was completed to Hollidaysburg, and on March 12, 1834, the whole line was thrown open. It was soon found, however, that there was an insufficient supply of water for the canal during the summer season, and surveys were made in 1835 by Sylvester Welch for a site for a reservoir to hold a sufficient supply of water for seasons of drought. He recommended its location on the South Branch of the Juniata, about a mile and a quarter from Hollidaysburg. On November 9, 1839, a contract was made for its construction, and operations commenced in April, 1840, but at the close of that season work was suspended until 1846, when it was resumed, and the reservoir was completed in 1847. A dam 30 feet high and 2,870 feet long was built for the reservoir, and the water covered 450 acres. The contents of this huge basin were 272,000,000 cubic feet. While being constructed, this canal was divided into three "lines"—Lower, Upper, and Frankstown. In 1857 it was sold to the Pennsylvania Railroad Company; part of it has since been abandoned, and the remainder, from Duncan's Island to Petersburg, is now operated by the Pennsylvania Canal Company. Ninety-five miles were in use in 1876. The report of 1852 states that the original cost of constructing this division was $3,570,016.29.

The Allegheny Portage Railroad.—The main line of canal terminated at the eastern base of the Allegheny mountains at Hollidaysburg and began again at the western base at Johnstown. Between these two points a railroad which crossed the mountains was constructed after plans prepared by Sylvester Welch, who had previously been chief engineer of the Western division of the canal. The surveys under Mr. Welch were made in the spring of 1831, and the work of construction began in April. Solomon W. Roberts was Mr. Welch's principal assistant at the commencement of the work, and led the exploring party under his direction. The location was begun about five miles west of the summit of the Alleghenies, and the line followed the general course of the Little Conemaugh toward the west. W. Milnor Roberts afterwards joined the engineer corps, and was the principal assistant on the eastern part of the road, including the steep descent of the eastern slope. The following facts in relation to this railroad have been obtained mainly from Solomon W. Roberts, who was until the end of 1835 resident engineer and superintendent of transportation of the Portage Railroad.

In April, 1831, the construction of the Portage Railroad was commenced, and the first train passed over it on the 20th of November, 1833. A single track was used during the season of 1834, and horses were used on the entire length of the road, over inclined planes as well as levels, as the hoisting machinery was not in place; but in 1835 the second track was completed, the hoisting engines were set, and the railroad was put into full operation. It crossed the mountains by a pass called Blair's gap, where it attained its summit level, 2,326 feet above the mean level of the Atlantic ocean, 1,398.31 feet above Hollidaysburg, and 1,172.88 feet above Johnstown. The preliminary operation of clearing a track for the passage of the railroad from 100 to 150 feet in breadth, through thick forests, was one in which no small difficulties were encountered. The timber removed from the line was chiefly spruce and hemlock of very large growth. When the trees were thickly covered with foliage they formed a wall on each side of the railroad which completely intercepted the view of the surrounding country. The line was laid throughout with a double track. On it there were four viaducts, one tunnel, and ten inclined planes; five planes being on each side of the mountain. The most important viaduct was designed by Solomon W. Roberts, and was built of cut stone, in one 80-foot arch, elevated 70 feet above the Conemaugh river, and is now used by the Pennsylvania Railroad. This viaduct crosses the Conemaugh about 8 miles east of Johnstown. The tunnel is about 5 miles east of Johnstown, and was constructed 900 feet in length, 20 feet wide, and 19 feet high. It has been used as part of a wagon road since the sale of the line in 1857. The inclined planes were the most remarkable works on the line. The total rise and fall on the whole length of the road from Hollidaysburg, its eastern terminus, to Johnstown, its western terminus, was 2,571.19 feet. Of this height 2,007 feet were overcome by the planes, and the remainder by the slight inclinations given to the parts of the road, called "levels," between the planes. The distance from Hollidaysburg to the summit was about 10 miles, and from the summit to Johnstown was about 26½ miles. The following table shows the lengths, gradients, and elevations overcome by the several inclined planes, five of which, commencing with No. 1, nearest Johnstown, were on the western slope; and five, commencing with No. 10, nearest Hollidaysburg, were on the eastern slope.

PLANES.	Length in feet.	Gradient.	Height overcome in feet.
No. 1	1,607.74	One in 10.71	150
" 2	1,760.43	" 13.29	132.40
" 3	1,480.25	" 11.34	130.50
" 4	2,195.94	" 11.68	187.86
" 5	2,628.60	" 13.03	201.64
" 6	2,713.85	" 10.18	266.50
" 7	2,655.01	" 10.19	260.50
" 8	3,116.92	" 10.13	307.60
" 9	2,720.80	" 14.35	189.50
" 10	2,295.61	" 12.71	180.52

The length of the levels, beginning at Johnstown, was as follows: 1st, 4.13 miles; 2d, 13.06 miles; 3d, 1.43 miles; 4th, 1.90 miles; 5th, 2.56 miles; 6th, summit level, 1.62 miles; 7th, 0.15 mile; 8th, 0.61 mile; 9th, 1.18 miles; 10th, 1.70 miles; 11th, from foot of plane No. 10 to Hollidaysburg, 3.72 miles. The total length of the road included both levels and planes, and amounted to 36.44 miles. The inclined planes were worked by an endless rope, 7½ to 8 inches thick, passing around grooved horizontal wheels at the head and foot of each plane, to which rope trains, of four cars generally, were attached by two smaller ropes fastening the couplings of the first and last cars of a train by a hitch or knot, so formed as to prevent the ropes from slipping. Hemp ropes were first used, but wire ropes were gradually introduced from the year 1842, when experiments were first made with wire rope manufactured by John A. Roebling, whose works were then at Pittsburgh, but were afterwards removed to Trenton. Motion was supplied to the large rope by stationary steam engines of 25 horse-power each, two of which were at the head of every plane, one to relieve the other in case of accident. The planes, like the levels, were laid with a double track of rails, and an ascending and a descending train could be attached to the rope at the same time. The machinery of the inclined planes was planned by Edward Miller, civil engineer, and built at Pittsburgh. Locomotive engines were used on some of the levels, but horses were used on the others. The first locomotive west of the Allegheny mountains was built at Boston, by the Mill Dam Foundry Company, and named *Boston*, and was placed on the Johnstown level in 1834. Two similar locomotives were built in the winter of 1834–5 for this railroad by McClurg, Wade & Co., of Pittsburgh. Others were added as they were needed. One of the Portage Railroad locomotives, built by McClurg, Wade & Co., was purchased by the Cambria Iron Company, and can be seen in daily use about the works at Johnstown. It was named the *Conemaugh*, but its diminutive size and quaint appearance have caused it to be known there as the *Coffee Pot*. It has two driving wheels only, its weight being partly supported by a forward truck or "bogie." The Cambria Iron Company also purchased another locomotive, the *United States*, built by Wm. Norris, and used it for some time to pump water out of a shaft at Johnstown. These locomotives are named in the report for 1838, but were built several years before that. The rails used on the Portage Railroad, after various patterns were tried, finally consisted of edge rails, laid in cast iron chairs, bolted to heavy stone blocks. These rails weighed about 39½ pounds per yard, were rolled at the Ebbw Vale Works in Wales, and cost $69.16 per ton delivered on the Alleghenies. Some of the chairs were cast in Great Britain, but most of them in Pennsylvania. The rails were fastened in the chairs by iron wedges called "keys," which were driven between the chair and the rail. These keys had to be inspected and hammered in every few days, being constantly loosened by the jar of passing trains. When the rails for the road were ordered, a number of short pieces from six to eight feet long were included for the purpose of making curves, but it was soon ascertained that the rails could be "sprung," and the curves were made in the present manner.

In Day's *Historical Collections* it is stated that in 1834 boats began to be transferred from the canals to cars, and were thus shipped over the mountains to the canals on the other side without disturbing their contents. The origin of this novel idea rests with John Dougherty, and the circumstances were as follows:

> In October, 1834, this portage was actually the means of connecting the waters of Eastern Pennsylvania with those of the Mississippi. Jesse Chrisman, from the Lackawanna, a tributary of the North Branch of the Susquehanna, loaded his boat, named *Hit or Miss*, with his wife, children, beds and other family accommodations, pigeons and other live stock, and started for Illinois. At Hollidaysburg, where he expected to sell his boat, it was suggested by John Dougherty, of the Reliance Transportation Line, that the whole concern could be safely hoisted over the mountain, and set afloat again in the canal. Mr. Dougherty prepared a railroad car calculated to bear the novel burden. The boat was taken from its proper element and placed on wheels, and under the superintendence of Major C. Williams the boat and cargo at noon on the same day began their progress over the rugged Allegheny. All this was done without disturbing the family arrangements of cooking, sleeping, etc. They rested a night on the top of the mountain, like Noah's ark on Ararat, and descended the next morning into the valley of the Mississippi, and sailed for St. Louis.

After this boats were so constructed that they could be divided into sections and hauled over the railroad on cars without breaking bulk, but they were not extensively used until about 1840. Cars were also used which were so built that they could be lifted bodily from their trucks by cranes and loaded on boats of special construction. Safety cars were devised to prevent trains from running back down the planes if the ropes broke. It is said that no serious accident ever took place on this road.

In 1836, from April 1st to October 31st, 19,171 passengers were conveyed over the line, and 37,081 tons of merchandise passed over it in 14,300 cars. In 1837 a train leaving Hollidaysburg at nine o'clock in the morning would reach the summit at twelve, where it stopped an hour for dinner, and it would arrive at Johnstown at five in the evening. In 1850 locomotives displaced horses on most of the levels between the planes. On the longer levels at each end of the road locomotives were used from 1834.

The construction of a new route over the mountains, intended to avoid the inclined planes, had been agitated for several years, exploratory surveys having been made in 1839, and in 1850 work was commenced on the new line of road, which ran a very short distance from the old road and in some places used part of it. In 1851 the construction of the Pennsylvania Railroad, then being built, had been pushed close to the mountains, and travel on it had increased so greatly that the Portage Railroad was operated at night as well as in the day, to accommodate the new traffic. The commissioners, in their report for 1852, stated that the construction of the Portage Railroad had cost $1,860,752.76. In 1852 plane No. 2 was abandoned, the new road avoiding its use having been completed that far. In the winter of 1851–2 the railroad was operated for the first time in that season of the year, to accommodate the Pennsylvania Railroad, whose track over the mountains was not ready for use until 1854. In 1855 the new Portage Railroad was completed for the passage of trains, and the old road and its inclined planes were abandoned in 1856. The new road cost $2,100,027.27. The rails were furnished by the Cambria Iron Company, of Johnstown, for $70 per ton. In 1857 the line was sold to the Pennsylvania Railroad Company, and its use was abandoned.

The Western Division of the Canal.—This part of the main line completed the chain of communication with Pittsburgh, extending to that city from the terminus of the Allegheny Portage Railroad at Johnstown. Its western end terminated in both Allegheny City and Pittsburgh. At Allegheny City there was an outlet lock by which boats passed into the Allegheny river. An aqueduct led the canal across the Allegheny into Pittsburgh, where there was another outlet lock into the Monongahela. The original aqueduct fell in 1844, and in 1845 John A. Roebling erected in its place a suspension aqueduct, consisting of a wooden trunk suspended from heavy wire cables. There were seven spans, of 162 feet each. This canal was constructed along the Conemaugh, Kiskiminetas, and Allegheny rivers. Its length was stated in 1856 at 104 miles. On the line there were, 11 dams, 65 locks, 16 aqueducts, 43 culverts, 46 overfalls, 18 towing-path bridges, and 89 road and farm bridges. The construction of this part of the canal commenced on the Allegheny river in 1826. In the autumn of 1827 water was first let into the levels at Leechburg. In 1829 contracts were made for the construction of the canal near Johnstown, and for a basin at that place to make a depot for boats. On August 21, 1829, it was opened for navigation from Pittsburgh to Blairsville, and on December 10, 1830, it was opened its whole length to Johnstown. While being constructed, it was divided into five "lines"—Allegheny, Pine Creek, Kiskiminetas, Conemaugh, and Ligonier. The first canal boat built or run west of the mountains was the *General Abner Lacock*, a freight and passenger packet, built at Apollo, Armstrong county, by Philip Dally, under the auspices of Patrick Leonard, of Pittsburgh. In 1834 an unsatisfactory attempt was made upon this canal to use steamboats.

The upper part of the canal was found to be but imperfectly supplied with water from the Stony creek at Johnstown, and in 1835 Sylvester Welch recommended the construction of a reservoir for the storage of water, to be used in cases of necessity, on the South Fork of the Conemaugh, about ten miles east of Johnstown, and two miles from the Portage Railroad. This reservoir when full covered 465 acres, was 65 feet deep, and its cubical contents were 524,000,000 cubic feet. The water of the reservoir was discharged into the Conemaugh river when needed, and thus flowed down to a dam at the head of the basin at Johnstown, passing into the basin through a short feeder. The work was contracted for on November 6, 1839, and commenced in 1840, but it was not then finished and was suspended for lack of funds until May 1, 1851, when it was again put under way, partly finished in 1852 so that water was obtained from it for the canal, and completed in 1853. In 1857 this division was sold to the Pennsylvania Railroad Company, and it was gradually abandoned. The upper part of the division was abandoned first, but the lower part was not closed until 1864. The Western Pennsylvania Railroad, completed in 1865, occupies the bed of the canal for the greater part of the western half of it. In the report for 1852 its cost was stated at $3,096,522.30.

The Susquehanna Division of the Canal.—This division commenced at Duncan's Island on the Susquehanna river, connecting there with the Eastern and Juniata divisions, and extended thence along the Susquehanna river to Northumberland, where two other divisions of the canal connected with it, one passing along the North Branch and the other along the West Branch of the Susquehanna river. The length of the Susquehanna division operated in 1856 was 42 miles. There were on its line, one dam, 16 locks, 8 aqueducts, 11 culverts, 3 overfalls, 7 towing-path bridges, 11 road bridges, and 48 farm bridges. The work of construction was commenced in 1827, and the canal was completed in 1830. In 1858 it was sold to the Sunbury and Erie Railroad Company, who transferred it in the same year to the Susquehanna and West Branch Canal Company, who sold it to the Pennsylvania Canal Company October 14, 1873, controlled by the Pennsylvania Railroad Company. In the report for 1852 its cost was stated at $897,160.52.

The West Branch Division of the Canal.—This part of the canal connected at Northumberland with the Susquehanna and North Branch divisions, and thence extended along the West Branch of the Susquehanna river to Farrandsville, in Clinton county, a short distance above Lock Haven. The length of the line operated in 1856 was 76 miles. There were on its line, 5 dams, 24 locks, 7 aqueducts, 27 culverts, 5 overfalls, 2 towing-path bridges, 45 road bridges, and 71 farm bridges. The work of construction was begun in 1828. In 1830 there were 24½ miles completed and navigable from Northumberland to the Muncy ripples, and this part was called the Muncy line. The name of Lycoming line was given to the upper portion of the canal, and it was contracted for in 1831. On July 4, 1834, it was opened to the mouth of Loyalsock creek near Williamsport, and before the close of the year to Dunstown near Lock Haven. In 1831 a canal five-eighths of a mile long was commenced, to connect Lewisburg with the canal, and it was finished in November, 1833. In 1833 a side cut to the Bald Eagle creek, 3⅝ miles long, was begun, and it was completed on July 4, 1834. In 1835 work was commenced on the Tangascootac extension of the canal, 7½ miles farther up the West Branch to the mouth of the Tangascootac creek. It was completed to Farrandsville in 1838. In 1838 a further extension was undertaken of 33 miles to the mouth of the Sinnemahoning creek, but after $141,214 were expended upon it work was suspended and has not since been resumed. This extension was estimated to cost $1,389,099. In 1858 the West Branch division was sold to the Sunbury and Erie Railroad Company, who transferred it in the same year to the Susquehanna and West Branch Canal Company, by whom it was sold to the Pennsylvania Canal Company October 14, 1873, controlled by the Pennsylvania Railroad Company. It is now operated to Flemington, near Lock Haven, 68 miles from Northumberland. The report for 1852 stated the cost of this division at $1,832,083.28.

North Branch Division of the Canal.—This part of the canal commenced at Northumberland, connecting there with the Susquehanna and West Branch divisions, and extended along the North Branch of the Susquehanna to the New York State line near Elmira, where it connected with the New York system of canals through the Junction canal. The length of this division in 1856 was 167.2 miles. There were on the line, 5 dams, 5 guard locks, 37 lift locks, 28 aqueducts, 29 waste-wiers, 70 culverts, 6 overfalls, and 214 bridges. On July

4, 1828, ground was broken for this division at Berwick, Columbia county, and in November, 1830, it was completed 55½ miles from Northumberland to Nanticoke Falls, but it was not wholly navigable. On September 27, 1831, it was opened throughout its length to Nanticoke Falls near Wilkesbarre. The first boat on this division was the *Wyoming*, which was built by Hon. John Koons, at Shickshinny. It was launched and towed to Nanticoke, laden with coal, flour, etc., and taken to Philadelphia. In 1831 an extension called the Wyoming line was begun, about 17 miles long, to reach to Pittston: on July 4, 1834, it was opened for navigation. In 1835 the packet boats, *George Denison* and *Gertrude*, were launched, and began to run between Northumberland and Wilkesbarre. In 1836 another extension of the line was begun, with the design of connecting with the New York canal system near Elmira, and 35 miles of the remaining 94.7 were put under contract, beginning at Athens, in Bradford county, and progressing southward. This was called the Tioga line. In 1838 the remainder of the extension, called the Tunkhannock line, was put under contract. In 1841 work on the extension from Pittston to Athens was suspended. In 1842 the Legislature incorporated the North Branch Canal Company, and transferred to it the unfinished works from the Lackawanna river to the New York line, provided it would finish the canal in three years.

In 1843 the completed canal from the outlet lock at Solomon's creek, near Wilkesbarre, to the Lackawanna river was given to this company, but it failed to finish the work, and in 1848 the State resumed it. The report for 1852 stated the actual cost of the whole North Branch division at $1,598,379.35. In December, 1853, the extension was reported completed, but much had to be done afterwards before it was put in navigable condition, and the first boat did not pass over it until November 11, 1856,—the *Tonawanda,* loaded with coal, bound from Pittston to Elmira. In 1858 the North Branch Division was sold to the Sunbury and Erie Railroad Company, who transferred it the same year to the North Branch Canal Company. In 1858 the North Branch Canal Company sold the canal from Northumberland to Wilkesbarre to the Wyoming Canal Company, and this part of the canal was merged into the Pennsylvania Canal in 1869, now controlled by the Pennsylvania Railroad Company. The remainder of the North Branch division, from Wilkesbarre to the New York line, became the property of the Pennsylvania and New York Canal and Railroad Company, incorporated March 20, 1865, which succeeded the North Branch Canal Company, and was authorized to build a railroad on the towpath or the berme bank of the canal. On April 2, 1872, an act was passed authorizing the abandonment of the canal, the railroad having been finished and opened in 1869. It is controlled by the Lehigh Valley Railroad Company. A small portion of the canal, not navigable, which supplies water from the Lackawanna feeder to the Pennsylvania Canal Company's Wyoming division, is still kept in repair.

The Beaver Division of the Canal.—This division was not connected by artificial means with the above-described lines of communication, but the Ohio river was a natural means of connecting the Beaver canal with the Western division at Pittsburgh. The Beaver division commenced on the Ohio river at the mouth of the Beaver, 28 miles below Pittsburgh, and extended along the Beaver and its affluent the Shenango, 30¾ miles, to six miles above New Castle, where it connected with the Erie extension. It was commenced in 1831, and was completed May 28, 1834. In 1840 a connection was made by private enterprise with the canals of the State of Ohio, by the Pennsylvania and Ohio Canal, which intersected the Beaver division a short distance south of New Castle, and connected with the Ohio canals at Akron, Ohio. On January 1, 1845, the State transferred the Beaver division to the Erie Canal Company, which operated it until 1871, when it was abandoned. Its cost of construction was $760,148.48.

The Erie Extension of the Canal.—This canal connected with the Beaver division above New Castle, and extended up the Shenango river, then passed near Conneaut lake in Crawford county and along Conneaut creek for a part of its course, and afterwards across to Erie. Its length was about 105½ miles. The French Creek feeder was the first part of this work to be attempted. It was commenced in 1827, and in 1830 it was finished and water was admitted from some small streams but not from French creek. This feeder was 21 miles long, from its commencement at Bemus's dam near Meadville, on French creek, to its terminus at Muddy run, near Conneaut lake. It was intended to supply water from French creek to Conneaut lake for the purpose of making the lake a reservoir for the Erie canal. No connection was made with the creek or the lake, and the feeder lay useless for several years. In 1833 work was resumed on the feeder; it was connected with the creek and the lake, and in November, 1834, it was declared navigable. In 1837 it was badly injured by freshets and was not again rendered navigable by the State, passing into the possession of the Erie Canal Company in 1843. The French Creek feeder had but one outlet to navigation during its ownership by the State; this was the Franklin line, which extended 22¼ miles along French creek, from a point about the middle of French Creek feeder, 7 miles below Meadville, to Franklin on the Allegheny river. It was commenced in 1831, and was opened in March, 1834. In his report for 1835 Sylvester Welch said there were no "regular built" boats on this division. All the produce was carried in flat boats adapted to the navigation of the Allegheny river, and they were used only when that river was high enough to float descending boats. In 1835 this line was seriously damaged by freshets, and, though it could only be used for descending navigation, was not afterwards repaired by the State, becoming the property of the Erie Canal Company in 1843.

The main line of the extension of the Beaver canal to Erie was commenced on September 6, 1836, after all the above portions were completed. It was divided into two "lines"—the Shenango and the Conneaut. The Shenango line was the southern half connecting with the Beaver division, and the Conneaut line was the continuation to Erie. The Shenango line was begun in 1836, and the Conneaut line in 1838, ground being broken at Erie for the latter on July 4, 1838. Two reservoirs were provided to supply the Erie extension with water—the Conneaut and the Pymatuming. The Conneaut reservoir was formed of Conneaut lake in Crawford county, into which a supply of water was poured from French creek by means of the French creek feeder. It covered 2,600 acres. The natural level of the lake was elevated three feet by embankments, and an additional elevation of eight feet was undertaken. The contents were estimated at 736,164,000 cubic feet. The Pymatuming reservoir, on the Shenango line, covered nearly 600 acres, and its contents were 215,622,000 cubic feet. The works promised to be very costly, and appropriations were not lavishly made by the Legislature; consequently the prosecution of the work languished, and on August 1, 1843, the whole of the extension was transferred by the State to the Erie Canal Company on condition that it would complete the canal and render the line navigable. The work was undertaken, and was prosecuted so vigorously that on December 5, 1844, the first boats passed through to Erie—*R. S. Reed*, Captain Drum, loaded with Mercer county coal, and the passenger boat, *Queen of the West*, Captain Armstrong. The Erie Canal Company operated the entire line from Beaver to Erie until September 15, 1870, when it sold its property to the Erie and Pittsburgh Railroad Company, who abandoned the whole canal in the autumn of 1871. The total cost to the State of the Erie extension from the terminus of the Beaver division north, including the French Creek feeder and the Franklin line, was $3,721,056.86.

The Wiconisco Canal.—This was a short line, 12½ miles in extent, and reached from the Eastern division of the canal near Duncan's Island along the Susquehanna to the mouth of Wiconisco creek, in Dauphin county, where it connected with the Lykens Valley Railroad, constructed by a private company for the transportation of coal from that region. It was begun in 1838, but, after the expenditure of over $300,000, the State suspended work on it. On March 13, 1845, the Wiconisco Canal Company was incorporated, and the State transferred the Wiconisco canal to it on condition that the company would complete it and put it into navigable order. This was soon done, and the canal was operated from that time. In 1871 the Pennsylvania Canal Company acquired a controlling interest in it, and since then it has been operated as a division of that line, a dependency of the Pennsylvania Railroad Company.

The Allegheny Feeder.—In 1838 a canal was commenced which was designed to extend 14 miles from the Western division at Free-port on the Allegheny river, at the mouth of the Kiskiminetas, up along the Allegheny river to Kittanning. It was to serve a double purpose—to supply the Western division with water, and to give Kittanning a navigable connection with the canal system, but it was not finished.

The Gettysburg Extension of the Columbia Railroad.—This work was commenced in 1836, and was intended to reach to Hagerstown, Maryland, a distance of 41¾ miles, making a connection there with the Baltimore and Ohio Railroad. A company had been chartered to build a railroad from Wrightsville, opposite Columbia, to Gettysburg, and the State proposed to extend the railroad from Gettysburg south. About 30 miles were graded, but in 1839 all work upon it was stopped. This was popularly known as "the Tapeworm railroad."

Short Lines, Feeders, etc.—On the list of canals published in the reports of the canal commissioners there appear the names of several short sections of water line, some being navigable, and most of them constructed to supply the canals with water. These were, the Bald Eagle side cut, 3⅝ miles long, on the West Branch division; Hollidaysburg feeder, 3¼ miles, on the Juniata; Johnstown feeder, 1½ miles, on the Western; Swatara feeder, 2 miles, on the Eastern; Raystown feeder, 1 mile, on the Juniata; Allegheny City branch, ¾ mile, on the Western; Lewisburg side cut, ⅝ mile, on the West Branch; Lackawanna feeder, ¼ mile, on the North Branch.

The Length and Characteristics of the Whole Line.—The following table, compiled from the report for 1856, is a recapitulation of the length of the above-named divisions:

DIVISIONS.	Miles.	DIVISIONS.	Miles.
Eastern Division	47	Brought forward	776.95
Juniata do.	132	Short lines, feeders, etc	13
Western do.	104		
Susquehanna Division	42	Total length of canal	789.95
West Branch do.	76	Columbia Railroad	81
North Branch do.	167.20	Portage Railroad	36.44
Delaware do.	60		
Beaver do.	30.75	Total length of canal and railroad	907.39
Erie Extension	105.50		
Wiconisco Canal	12.50		

The average width of the canals was 40 feet at the top and 28 feet at the bottom, and the depth was generally about 4 feet. The size of the lock chambers was usually from 90 feet by 15 feet to 90 feet by 17 feet; in some cases, however, they were made a great deal larger, as for instance at the Ohio terminus of the Beaver canal, where the lock was made large enough to admit steamboats from the Ohio into the first pool.

Financial Statement.—A financial statement has been specially prepared for this sketch in the Auditor-General's office at Harrisburg, showing the receipts from the canals and expenditures on their account from 1830 to 1859. From 1844 the expenditures include the cost of new improvements. The table is as follows:

Years.	Receipts.	Expenditures.	Years.	Receipts.	Expenditures.
1830	$25,748.68	$127,854 31	1846	$1,357,203.37	$694,505.12
1831	38,241.20	303,184.61	1847	1,587,995.61	690,575.95
1832	50,909.57	377,179.07	1848	1,550,555.03	996,592.70
1833	151,419.69	358,922.75	1849	1,628,860 13	951,249.03
1834	309,789.15	369,774.33	1850	1,713,848.16	1,488,799.74
1835	684,357.77	551,596.61	1851	1,719,788.54	1,823,709 92
1836	837,805.72	707,130.59	1852	1,938,574.43	2,224,379 53
1837	975,350.49	934,137.74	1853	1,893,246.50	2,755,936.64
1838	959,336.32	742,898.58	1854	1,918,606.30	2,294,357.43
1839	1,076,045.47	1,047,694.24	1855	1,942,376.71	1,838,791.18
1840	1,195,751.33	1,532,910.07	1856	2,006,015.66	1,943,896.82
1841	1,055,394.60	991,558.20	1857	1,308,598.62	1,312,705.67
1842	907,093.12	1,010,737.22	1858	95,070.06	202,665.62
1843	1,019,401.15	743,562.89	1859	4,411.78	2,659.77
1844	1,164,325.84	719,126 08			
1845	1,154,591.55	661,340.66	Total,	$32,270,712.55	$30,400,433.07

A financial statement of the affairs of Pennsylvania was made in 1844 by J. W. Hammond, in which the total cost of the improvements up to that time was put at $21,529,309.41, including the expenses of officers and exploratory surveys. The unfinished improvements he estimated would cost $7,087,065.60 additional. In 1852 the commissioners stated the cost of the canals and railroads then being operated at $20,768,307.54, excluding the Wiconisco canal, the Beaver division, the Erie extension, and the abandoned routes on which large sums had been expended. After that time the new Portage Railroad was built, costing $2,100,027.27, and other works of construction were prosecuted. The total cost of construction of the State works could not have been less than $30,000,000. Repairs, alterations, etc., swelled this amount considerably, but it is hardly possible to form an approximate estimate of the total amount which these improvements cost up to the time when the State disposed of them. In 1853 it was estimated by Eli Bowen, in his *Sketch Book of Pennsylvania*, that the State had to that time expended not far from $100,000,000 on internal improvements, including damages, repairs, interest, and subscriptions to turnpikes and bridges. In 1857 the State sold the main line of its works to the Pennsylvania Railroad Company for $7,500,000, and a constitutional amendment was adopted prohibiting the State from constructing or being a stockholder in any canal or railroad. As the Beaver and Erie divisions and the Wiconisco canal had long before been disposed of, the State retained only the Susquehanna, West Branch, North Branch, and Delaware divisions, and in 1858 it sold these to the Sunbury and Erie Railroad Company for $3,500,000. In 1859 the board of canal commissioners was abolished by the Legislature, its functions having ceased by the sale of all the improvements.

The Board of Commissioners.—The following is a list of the members of the board of canal commissioners of Pennsylvania, which has been specially furnished for this sketch by the Auditor-General, Hon. Justus F. Temple.

1824. Appointed by the Governor: Jacob Holgate, James Clarke, Charles Trcziyulney.
1825. John Sergeant, Robert M. Patterson, William Darlington, David Scott, Abner Lacock.
1826. William Darlington, Thomas Enoch, John Phillips, Charles Mowry, George M. Dallas, Abner Lacock, John Sergeant, David Scott, Robert M. Patterson.
1827. David Scott, John Sergeant, Abner Lacock, Charles Mowry, Thomas Enoch, Daniel Montgomery, John Phillips, Jonathan Roberts, James Clarke.
1828. Daniel Montgomery, David Scott, Thomas Enoch, Charles Mowry, John Sergeant, Jonathan Roberts, Abner Lacock, John Phillips, James Clarke. In August Thomas Enoch resigned, and Mr. Hammond was appointed in his place.
1829. Appointed by the Legislature: David Scott, John Mitchell, Peter S. V. Hamot, James S. Stevenson, James Clarke. Robert M. Patterson (in place of B. W. Richards, resigned), John Forrey, Nathaniel B. Eldred, David Frazier.
1830. Appointed by the Governor: James S. Stevenson, James Clarke, John Mitchell.
1831. James Clarke, John Mitchell, James M. Linnard (in place of James S. Stevenson, deceased).
1832. James Clarke, John Mitchell, Josiah White (in place of J. M. Linnard, resigned).
1833. James Clarke, John Mitchell, Robert McCoy (in place of Josiah White, resigned).
1834. James Clarke, John Mitchell, Robert McCoy.
1835. James Clarke, John Mitchell, Robert McCoy.
1836. Moses Sullivan, Joseph Smith, James D. Paxton.
1837. Moses Sullivan, Joseph Smith, Peter Levergood.
1838. John Dickey (in place of John Taggart), Thaddeus Stevens, E. F. Pennypacker.
1839. James Clarke, Edward B. Hubley, Wm. F. Packer.
1840. Edward B. Hubley, John B. Butler (in place of Hugh Keys, deceased), Wm. F. Packer.
1841. Edward B. Hubley, John B. Butler, Wm. F. Packer.
1842. John B. Butler, Levi Reynolds, Jr., Wm. Overfield (in place of G. M. Hollenback).
1843. John B. Butler, Levi Reynolds, Jr., William Overfield.
1844. Beginning with 1844, the commissioners were elected for three-year terms: James Clarke, Jesse Miller, William B. Foster, Jr.
1845. James Clarke, William B. Foster, Jr., Joshua Hartshorne.
1846. William B. Foster, Jr., Joshua Hartshorne, James Burns.
1847. Joshua Hartshorne, James Burns, James M. Power.
1848. James Burns, James M. Power, Morris Longstreth.
1849. James M. Power, Morris Longstreth, Israel Painter.
1850. Morris Longstreth, Israel Painter, John A. Gamble.
1851. Israel Painter, John A. Gamble, William T. Morrison.
1852. John A. Gamble, William T. Morrison, Seth Clover.
1853. Wm. T. Morrison, Seth Clover, Wm. Hopkins.
1854. Seth Clover, Wm. Hopkins, Thos. H. Forsyth.
1855. Wm. Hopkins, Thos. H. Forsyth, Henry S. Mott.
1856. Thomas H. Forsyth, Henry S. Mott, Arnold Plummer.

POST 58, G.A.R.

1857. Henry S. Mott, Arnold Plummer, George Scott.
1858. Arnold Plummer, George Scott, Nimrod Strickland.
1859. George Scott, Nimrod Strickland, William E. Frazer. The board was abolished in 1859.

The following gentlemen were secretaries to the board: 1824–'29, Joseph McIlvaine. 1829–'36, Francis R. Shunk. 1836–'38, E. F. Pennypacker. 1838–'39, Wm. C. McPherson. 1839–'44, Thos. L. Wilson. 1844–'47, David Mitchell, Jr. 1847–'59, Thos. L. Wilson.

The Youghiogheny Improvement.—Although not strictly in its proper place, we will here mention the improvement of the navigation of the Youghiogheny river in Southwestern Pennsylvania. Under the direction of the Youghiogheny Navigation Company two locks and dams were built on this river, which extended slackwater navigation from its junction with the Monongahela river to West Newton, in Westmoreland county, a distance of 18 miles. The work was completed in 1851, and for fourteen years the Youghiogheny improvement was a feeder to the trade on the Monongahela river. In 1865 an ice-flood ruined the dams and locks, and they have not since been rebuilt. The Youghiogheny improvement has been abandoned since that time.

The Railroads of Pennsylvania.—Few States have been more enterprising than Pennsylvania in the introduction of improvements of every description, and the people of this Commonwealth early sought to obtain the best system of transportation that the progress of the times brought forward. They constructed turnpikes, dug canals, improved river channels, and built railroads, always relying on their own financial ability, and receiving no aid from the General Government in the shape of land grants or in any other form. The topography of Pennsylvania is not naturally favorable for the construction of railroads. It does not possess the treeless plains which invited the rapid building of railroads in the West at a comparatively cheap cost, but its surface is broken by mountain ranges, cut by broad rivers, and much of it is even yet covered by forests of large trees. The building of railroads through such a State involved the exercise of the highest engineering skill, and the cost of these works called forth great financial talent in the successful completion of the leading lines of railroads. At the close of 1876 Illinois, a prairie State, alone surpassed Pennsylvania in length of completed railroads; Illinois having 7,285 miles and Pennsylvania 5,983 miles, New York coming third with 5,525 miles, according to Poor's *Manual*. The present satisfactory development, however, has been attained very gradually.

The Invention of Railroads.—Railroads, made of wood and called tramways, have been used in England from the early part of the seventeenth century to transport coal from the pit's mouth to the place of shipment. Coal wagons were drawn on these roads by horses. The first road of this kind on record, Brown says, in his *History of the First Locomotives in America*, was built as early as the year 1630 at Newcastle-on-Tyne by a man named Beaumont. On these early roads the tops of the rails were rounded off to fit into a groove cast in the surface of the wheel to prevent it from leaving the track. Gradually these roads spread throughout the mining districts of England, Scotland and Wales, and improvements were made by the use of iron, first in the form of a flat strap laid on the top of the wooden rail as a protection, and at length in 1738 in the shape of a rail made wholly of iron. Rails were then cast, and to prevent the wheels of the cars from running off the track a flange was cast on the outside of the rails like the rails of the present city passenger railroads, but afterwards the flange was changed to the inside of the rail. In 1789 flanges commenced to be cast on the wheel instead of the rail, William Jessop having originated this plan in the construction of a railroad in Loughborough, in Leicestershire, England. The rails without flanges were called edge rails. In 1801 the first legislative act ever made authorizing a public railway was granted by the English Parliament for the "*Surrey Iron Tramroad*," nine miles long. Cast rails in three or four foot lengths continued to be used until 1820, when machinery was invented to roll iron into suitable shapes for rails.

The Invention of Steam Carriages.—Toward the close of the last century many experiments were made in Europe and America to utilize steam in propelling land vehicles, as well as marine vessels. James Watt had perfected the steam engine in 1769, bringing under complete control an agent which had been known to exist from time immemorial. Applications of Watt's invention were made to every purpose in which a motive power was desired. Among the experiments most earnestly investigated was the application of steam power to land vehicles. The first model of a steam carriage had been constructed in 1763, in Paris, France, by an army officer, Nicolas Joseph Cugnot, says Brown's *History of the First Locomotives in America.* At the expense of the French monarch he built an engine to run on common roads in 1769, which was said to be a creditable piece of work. In 1790 he built another, also successful in self-locomotion, which is still to be seen in the museum of the Conservatoire des Arts et Metiers at Paris. The first English model of a steam carriage was made in 1784 by William Murdoch. It worked well, but the machine was not put to use. In 1804 Oliver Evans, a famous mechanic of Philadelphia, built a steam machine for cleaning docks, and mounting it on wheels drove it by its own engine from his works a mile and a half to the river, where he launched it, and then rigging paddle-wheels made it propel itself through the water to its working station. He afterwards built steam carriages that performed very well. Following these efforts were numerous attempts in Europe and America to make steam carriages for common roads which promised to be quite successful, when attention was drawn to the advantages to be gained by the use of railroads, and locomotives superseded steam carriages.

The Invention of Locomotives.—The first use of a locomotive upon rails was made upon the Merthyr Tydvil railway in Wales in 1804 by Richard Trevithick, a foreman at a tin mine in Cornwall, England. He had previously built a successful steam carriage. His railroad locomotive did very well upon a level surface, but was too light to draw a load up a slight inclination. Various devices were tried by other inventors, but the first completely successful locomotive was probably not built until 1822, when George Stephenson, who had been working upon the difficult problem from 1814, introduced locomotives on the railroad of the Hatton colliery. Brown's *History of the First Locomotives in America* says that this road was altered to a locomotive railroad in 1819, and Stephenson was appointed its chief engineer. He began his labors, and on November 18, 1822, opened the road with five of his engines. Every one drew 17 loaded wagons, averaging 64 tons, at four miles an hour. Stephenson next became chief engineer of the Stockton and Darlington Railroad, another coal road about being constructed, 12 miles in length. This road passed over very rough country, and a limited capital compelled the construction of inclined planes in some places, to be worked by stationary engines; other parts of the road were built for either horses or locomotives, and both were used for some time. The Secretary of the English Institution of Mechanical Engineers says, "the gauge of the road between the rails was 4 feet 8 inches, that being the regular gauge for the colliery tramways, worked by horses, with which this railroad connected. The rails were rolled fish-bellied, and weighed 28 lbs. to the yard. A small portion of the line was laid with cast iron fish-bellied rails." Stephenson established a locomotive works, and there built three locomotives for this road, which was opened on September 27, 1825. The *Active No. 1* was the first locomotive built at this establishment. Stephenson drove an engine on the opening day, and at times attained a speed of the rate of twelve miles an hour. A passenger car, named the *Experiment*, was used on the opening day, being the first one devised, and on October 10, 1825, it was put on the road for regular service. It was drawn by one horse at the rate of six miles an hour, while the coal trains were drawn by locomotives at about the same rate of speed. Afterwards, on the payment of toll, many persons put passenger cars on the road. As there was but one track and there were only occasional turnouts, these cars often met and quarrels as to the right of way arose, in which the passengers took part, before one of the cars would go back to a turnout. The railroad company at length stopped the trouble by taking into its own charge all transportation. In 1829 fourteen miles of the Liverpool and Manchester Railroad were completed, (it was opened in 1830,) laid with rolled iron rails weighing 35 lbs. to the yard and made in 15-foot lengths, but the managers were undecided whether to use stationary engines or locomotives. It was proposed to put stationary engines along the road a mile and a half apart to furnish motion to a chain to which the train would be attached. Their chief engineer, George Stephenson, however, induced the managers to make a trial of locomotives, and they offered a prize of £500 for the best locomotive that would attain certain prescribed mechanical conditions. October 1, 1829, had been fixed as the day of trial, but the 6th was afterwards selected, to give some of the engine-builders more time. The following engines competed for the prize: *Rocket*, built by Stephenson & Co., Newcastle; *Novelty*, built by Braithwait & Ericsson; *Sanspareil*, built by Timothy Hockworth; *Perseverance*, built by Mr. Burtsall. The *Novelty* attained the greatest speed, but unfortunately became disabled and was withdrawn from the trial; the *Rocket* performed all the stipulated conditions, eclipsed all the other engines and won the prize. Mr. Ericsson, whose name appears in connection with the *Novelty*, is Captain John Ericsson, now of New York, the inventor of the *Monitor* ironclad. The result of the experiment induced the managers to adopt locomotives, and from that time their use on railroads was assured. The gauge of the Liverpool and Manchester Railroad was made 4 feet 8½ inches to "allow a certain amount of play in the gauge of wheels and rails." Mr. Thomas L. Gooch of Saltwell, Gateshead, wrote in 1877 to the Secretary of the English Institution of Mechanical Engineers: "The same gauge as the Liverpool and Manchester railway, 4 feet 8½ inches, had to be used for the Grand Junction and the London and Birmingham railways, forming the through communication which was opened eight years later, in 1838, from the Liverpool and Manchester line to London, and 4 feet 8½ inches became, consequently, established as the standard dimension for the gauge. In several of the succeeding railways the original gauge was increased one-half inch more to 4 feet 9 inches; but these were subsequently altered, and 4 feet 8½ inches has been since adhered to as the standard gauge."

The Introduction of Railroads into the United States.—The increase of railroads and the successful use of locomotives in Great Britain deeply interested the people of the United States. It had been early perceived that the introduction of railroad transportation would be of vast benefit to this country. In 1800 an experimental tramway was set up in the yard of the Bull's Head tavern, on Third street, above Callowhill, in Philadelphia, by Thomas Leiper. It is described as consisting of two parallel courses of oak scantling about four feet apart, supported on blocks or sleepers about eight feet from each other. This road was twenty-one yards long, and had an ascent of one and a half inches in a yard. One horse hauled 10,696 lbs. up this track. The purpose of the experiment was to demonstrate the possibility of providing a cheap substitute for canals. In 1807 Silas Whitney built a railroad on Beacon hill, near Boston, Mass., to haul down gravel. There were two tracks, and a full car descending drew up an empty car. In 1809 a tramway was laid out by John Thomson, civil engineer, father of J. Edgar Thomson, late president of the Pennsylvania Railroad Company, in Delaware county, Pa. It was built for Thomas Leiper of Philadelphia, was 60 yards long, graded an inch and a half to the yard, the gauge was four feet, the rails were made of wood, and the sleepers were eight feet apart. A trial with a loaded car was so satisfactory that Mr. Leiper had a similar wooden railroad built from his stone quarries on Crum creek, in Delaware county, to his landing on Ridley creek, a distance of one mile, which Sipes's *Pennsylvania Railroad* says was used for nineteen years. A tramway with wooden rails was built at Bear Creek furnace in Armstrong county, Pa., in 1818. A short railroad with wooden rails is said to have been built at Nashua, New Hampshire, in 1825. Other tramroads of short lengths were built in various places to haul coal, etc. The first railroad of more than local note was the Quincy Railroad, four miles long, which ran from a granite quarry to the port of Neponset in Massachusetts, having been built in 1826. Its rails were also made of wood, but they were strapped with iron. Another railroad was completed early in the following year, at Mauch Chunk, Pa., connecting the Lehigh Coal and Navigation Company's coal mine with the Lehigh river. Its length was nine miles, and it had four miles of sidings. Its rails were likewise made of wood strapped with iron. Gordon's *Gazetteer* (1832) says: "The railway is of timber, about 20 feet long, 4 inches by 5, and set in cross pieces made of cloven trees placed 3½ feet from each other and secured by wedges. The rail is shod on the upper and inner edge with a flat bar of iron 2¼ inches wide and ⅝ of an inch thick." Loaded cars descended it by gravity and were drawn back empty by mules. It is a notable fact that these railroads were built to supply a local necessity for cheap transportation of freight, and were not intended to convey passengers or to do general business.

The First Locomotive Operated in the United States.—In 1826 the railroad, 16 miles long, connecting the Delaware and Hudson Canal Company's canal with its coal mines at Carbondale, Pa., was commenced, and in 1829 it was completed. On this railroad the first locomotive in America was run. The locomotive was built at Stourbridge, England, and was called the *Stourbridge Lion.* It was tried on the railroad on August 8, 1829, before the prize competition took place on the Liverpool and Manchester Railroad. Horatio Allen, assistant engineer of the company, ran the engine upon its trial trip. It operated satisfactorily, but it was found to be too heavy for the railroad, and therefore was not used. After keeping it for several years, meanwhile endeavoring to sell it, the owners had it taken to pieces and the parts sold. The boiler is still in existence at Carbondale in Pennsylvania.

Beginning of Important American Railroads.—The most important enterprises in railroad building, begun in 1828, were the Baltimore and Ohio Railroad in Maryland and the Charleston and Hamburg Railroad in South Carolina. The intention of the projectors of the Baltimore and Ohio Railroad was to use horses to draw the cars on their road, and it was supposed, after a few miles of the road had been built, that the sharp curves which were unavoidable in its construction would entirely preclude the use of locomotives. The company used horses for some time, meanwhile trying all sorts of motors, such as horse-power cars, sails, etc. Peter Cooper, of New York, then the owner of much real estate in Baltimore, was actively interested in the progress of the railroad, and, believing that much depended upon its efficiency, he volunteered to construct a locomotive that would safely round the curves at a good rate of speed, and he succeeded in doing so in 1829, when thirteen miles of the railroad had been laid. The engine, however, did not perform as well as Mr. Cooper wished. He therefore changed his plan slightly, and on August 28, 1830, his locomotive, the *Tom Thumb*, made a perfectly satisfactory trip. This was the first locomotive built in America. Its boiler was about the diameter of a kitchen boiler, but not half so long, and the tubes in it were made of gun barrels. It used anthracite coal. It ran thirteen miles in an hour and a quarter, but was hardly more than a toy, and was only intended to be an experiment. The following year, 1831, the Baltimore and Ohio Railroad Company offered to pay $4,000 for the most approved engine which should be delivered for trial upon the road on or before the 1st of June, 1831; and $3,500 for the engine which should be adjudged the next best, and be delivered as aforesaid. The engines were to be smoke-consuming, coke or coal burning, not over 3½ tons in weight, and capable of drawing 15 tons 15 miles per hour. Other but less important conditions were prescribed. In a letter to the author of the *History of the First Locomotives in America*, Benjamin H. Latrobe says this "brought upon the road an odd collection of four or five original American ideas. The engine which took the premium was built by Mr. Phineas Davis, which was the model for those built after it for three or four years." Phineas Davis was a resident of York, Pa.

The First American Locomotives for Regular Service.—Under the advice of Horatio Allen, the South Carolina Railroad Company decided to use locomotives on their railroad from Charleston to Hamburg, as soon as it should be built. In 1829 six miles were completed, and on March 1, 1830, the company made arrangements with E. L. Miller, of Charleston, to construct a locomotive for them at the West Point Foundry on Beach street, New York. His plans and specifications were drawn out by C. E. Detmold. In October, 1830, the builders shipped this engine to Charleston. It was the first engine built in America for regular service, and was named the *Best Friend of Charleston.* On November 2, 1830, its trial trip was made, resulting satisfactorily, and the locomotive was thereafter regularly worked. On June 17, 1831, its negro fireman ignorantly weighted the safety-valve to stop the noise made by the escaping steam, and the boiler burst, injuring several men but killing nobody. The locomotive was repaired, named the *Phœnix*, and again placed upon the road. The second American engine was built by the West Point Foundry from plans sent by Horatio Allen, and was put in service in March, 1831. It was named the *West Point.* While waiting for these engines the company used horses to draw their cars, and offered a premium of $500 for the best locomotive by horse-power. This premium was awarded to C. E. Detmold, who invented a horse-power working on an endless chain platform, like the horse-powers now used for threshing. It carried twelve passengers twelve miles an hour. Sails were also tried, but as soon as the company procured a supply of locomotives they superseded every other motor. The third American locomotive built for service was put in use to draw the pioneer passenger train of New York on August 9, 1831. It was called the *De Witt Clinton*, and was built at the West Point Foundry, in New York, under the direction of John B. Jervis, for the Mohawk and Hudson Railroad, between Albany and Schenectady, chartered April 17, 1826, but not completed until 1831. This locomotive, in appearance, was the nearest approach yet made to those now in use. It weighed 3½ tons, and could run 30 miles an hour. Mr. Jervis was the inventor of the forward truck, or "bogie," now used under all American passenger locomotives, and under most freight locomotives.

Beginning of Railroads in Pennsylvania.—One of the first acts passed by a legislature in America authorizing a company to construct a railroad for public use was that granting permission to John Stevens (the builder of the steamboat *Phœnix*) and others to build a railroad from Philadelphia to Columbia. It was enacted March 31, 1823, by the Legislature of Pennsylvania, but that company did not do anything toward building the contemplated road, and the State afterwards assumed the completion of the undertaking.

To the close of the year 1830, Gordon says, 28 railroad companies had been incorporated by the State of Pennsylvania. Of these, a few roads in the coal regions, operated by horses, and the State railroads were the only ones that were in course of construction prior to 1831. In that year 11 companies were authorized to build railroads. Among these was the Philadelphia, Germantown and Norristown Railroad, of which five miles were completed in 1832. In January, 1833, the first successful locomotive made in Philadelphia, and the best one that had then been made in the United States, was put upon this road by the builder, M. W. Baldwin, of Philadelphia, founder of the present celebrated Baldwin Locomotive Works. It ran a mile in less than a minute. Six companies were incorporated in 1832, among them the Philadelphia and Trenton Railroad Company, and the Harrisburg, Portsmouth, Mount Joy and Lancaster Railroad Company. Many of the companies incorporated in these years did not lay any track, but in the following years railroad building was actively pushed by strong organizations, each succeeding decade finding the State better supplied with transportation facilities than in its previous history. The Pennsylvania canal commissioners' report for 1836 says that at that time in Pennsylvania the following railroads were completed: Mauch Chunk, 9 miles; West Chester, 9 miles; Room Run, 5¼ miles; Philadelphia, Germantown and Norristown, 21 miles; Mine Hill and Schuylkill Haven, 20 miles; Mount Carbon, 7 miles; Lykens Valley, 16½ miles; Little Schuylkill, 21½ miles; Schuylkill Valley, 10 miles; Mill Creek, 4 miles; Pine Grove, 4 miles; Carbondale, 16¼ miles; Philadelphia and Trenton, 26¼ miles; Beaver Meadow, 26½ miles: total, 196¼ miles, built by incorporated companies. The State railroads completed were then given as follows: Philadelphia and Columbia, 82 miles; Allegheny Portage, 36 miles: total, 118 miles. The grand total of the mileage of railroad built by the State and by companies was 314¼ miles. In the same year the following railroads were in course of construction by companies: Reading and Port Clinton, 20 miles; Philadelphia and Reading, 54 miles; Philadelphia and Wilmington, 17 miles; Catawissa and Tamaqua, 38½ miles; Sunbury and Pottsville (branch included), 51½ miles; Williamsport and Elmira (6¾ miles in New York), 73½ miles; Lancaster and Harrisburg, 36 miles; Harrisburg and Chambersburg, 50 miles; Downingtown and Norristown, 20 miles; Marietta and Columbia, 3 miles; Strasburg, 5 miles: total, 368½ miles.

The Foresight of a Pennsylvania Governor.—David R. Porter, who was Governor of Pennsylvania from 1838 to 1845, said in his first message to the Legislature: "There are two subjects which are so essentially necessary to the full fruition of the benefits to be derived from our main lines of canals and roads between the eastern and western sections of the Commonwealth as to awaken the earnest solicitude of every true Pennsylvanian. I allude to the removal of the obstructions to steamboat navigation in the Allegheny, Ohio, and Mississippi rivers, from Pittsburgh to the gulf of Mexico, and from Pittsburgh up the Allegheny as far as the same may be found practicable by the survey authorized under the direction of the General Government, and to the construction of a continuous railroad from the city of Pittsburgh, through or near the capitals of Ohio, Indiana, and Illinois, to some point on the

Mississippi river at or near St. Louis." Though this portion of his message was received as the dream of a visionary, Governor Porter, who died in 1868, lived to see his expectations of railroad progress more than realized.

Growth of Railroad Construction.—The following table shows the gradual growth of railroad construction in Pennsylvania from 1835 compared with the United States, according to Poor's *Manual of Railroads.*

Year.	Miles in Operation.		Year.	Miles in Operation.		Year.	Miles in Operation.	
	U. S.	Penna.		U. S.	Penna.		U. S.	Penna.
1830	23	....	1846	4,930	840	1862	32,120	3.006
1831	95	....	1847	5,598	1,006	1863	33,170	3,171
1832	229	....	1848	5,996	1,048	1864	33,908	3,360
1833	380	....	1849	7,365	1,120	1865	35,085	3,728
1834	633	....	1850	9,021	1,240	1866	36,827	4,097
1835	1,098	318	1851	10,982	1,297	1867	39,276	4,311
1836	1,273	339	1852	12,908	1,372	1868	42,255	4,398
1837	1,497	466	1853	15,360	1,404	1869	47,208	4,598
1838	1,913	608	1854	16,720	1,537	1870	52,898	4,656
1839	2,302	691	1855	18,374	1,800	1871	60,568	5,113
1840	2,818	754	1856	22,016	1,925	1872	66,735	5,369
1841	3,535	754	1857	24,503	2,081	1873	70,784	5,550
1842	4,026	789	1858	26,968	2,340	1874	72,695	5,687
1843	4,185	789	1859	28,789	2,442	1875	74,614	5,868
1844	4,377	798	1860	30,635	2,598	1876	77,470	5,983
1845	4,633	798	1861	31.286	2,802	....	....	....

Descriptions of Leading Pennsylvania Railroads.—Brief descriptions of some of the most important railroads in the State are here given, derived largely from Poor's *Manual.* The railroads which carry anthracite coal mainly are first described.

The Philadelphia and Reading Railroad Company, whose road forms the chief outlet for the Schuylkill region, was chartered April 4, 1833, surveys were made the same year, and 41 miles were placed under contract for construction a year afterwards. Its first charter authorized its completion from Philadelphia to Reading, a distance of 54 miles from its terminus at Peters's Island, four miles from Philadelphia, where it connected with the Philadelphia and Columbia Railroad. Work was commenced early in 1835, and portions of the road were opened for travel in July, 1838. From the Falls of Schuylkill, a short distance above Peters's Island, a branch five miles long was completed in 1842 to Port Richmond, its shipping point on the Delaware. The right of laying a track from Reading to Port Clinton, in Schuylkill county, twenty miles, had previously been conferred upon the Little Schuylkill Railroad Company, whose original line ran from Tamaqua to Port Clinton, twenty miles. The company named failed to complete its road through lack of means, and transferred its privileges to the Philadelphia and Reading Railroad Company. By act of March 20, 1838, authority was given to extend the road to Mount Carbon, or to Pottsville, one mile above

Mount Carbon. As these two points were already connected by a railroad called the Mount Carbon Railroad, it was decided to extend the road to Mount Carbon and connect therewith. The Mount Carbon Railroad was leased and subsequently was merged into and became part of the main line of the Philadelphia and Reading Railroad Company, which pushed to completion the entire road from Pottsville to Peters's Island, 90 miles, and opened it for travel January 1, 1842. The State railroad from Broad and Willow streets in Philadelphia to Peters's Island, now Belmont station, on the Schuylkill river, four miles in length, was purchased by this company after the State railroad tracks had been re-located to avoid the Schuylkill inclined plane in 1850. It is used for the passenger trade and general city freight trade, while the branch to Port Richmond is almost exclusively used for coal, mainly intended for shipment by water to points on the coast or to foreign countries. At this eastern terminus (Port Richmond) there are now twenty-three wharves, extending from three hundred to eight hundred feet into the river Delaware, and erected on trestlework. Each wharf is provided with shutes, allowing a direct discharge of coal from the cars into vessels. Since the opening of this branch over fifty millions of tons of coal have been shipped over these wharves, principally for consumption in the Eastern and Middle States. To accommodate this immense shipping business, thirty-six miles of track are distributed on the wharves or in their immediate neighborhood. The grade of this railroad has been admirably arranged for its peculiar traffic, being a continual descent from Schuylkill Haven to the Falls of Schuylkill, about 83 miles. Locomotives are thus enabled to draw extraordinarily long trains of loaded cars, largely economizing the railroad service.

The anthracite coal regions are now supplied with a complete network of railroads, penetrating to every accessible point, and those in the Schuylkill region are with few exceptions either leased or owned by this company. Its branches stretch to Columbia, Harrisburg and Williamsport, in the interior, and to Philadelphia and Chester on the Delaware. The Susquehanna Canal from Columbia, Pa., to Havre de Grace, Maryland, is leased by it, and gives it interior water communication with Baltimore. It has also leased the Schuylkill Navigation Company's canal, and the Philadelphia, Germantown, and Norristown Railroad, thus securing the trade of the Schuylkill valley. The other leased roads will be found in a list of the railroads of Pennsylvania which follows this sketch. This company has introduced what are known as workmen's trains: special privileges as to rates are offered, enabling workmen to travel to and from their daily labor at little cost. Their system of cheap tickets has been of vast service to the company, and one of the branches—the Germantown and Norristown Railroad—has the largest local travel per mile and runs the largest number of passenger trains of any single road in the United States. Through the Philadelphia and Reading Coal and Iron Company, in which the railroad company owns all the stock, most of the collieries in the Schuylkill region are controlled. The company also owns a fleet of iron steamships, which it employs in carrying coal from Port Richmond to cities along the coast. The united length of all the railroads under the control of this company is 799.4 miles, all of which lie within the borders of Pennsylvania. The president of the company is Franklin B. Gowen of Philadelphia.

The Lehigh Valley Railroad Company, whose road taps the Lehigh, Schuylkill and Wyoming regions, was chartered as the Delaware, Lehigh, Schuylkill, and Susquehanna Railroad Company, April 23, 1846, and under its present title on January 7, 1853. It was originally designed to extend from Phillipsburg, New Jersey, to Wilkesbarre, Pa., 101 miles, and that part of it was completed in October, 1855. In 1872 an extension was begun through New Jersey to Amboy, 60 miles, which was completed June 27, 1875. The total length of the main line and branches at the close of 1876 was 301.99 miles. Its control of other railroads extends to Geneva, New York. Its president is Asa Packer of Mauch Chunk.

The Lehigh and Susquehanna Railroad, which reaches the Lehigh and Wyoming regions, was commenced by the Lehigh Coal and Navigation Company in 1837, and completed in 1840 from White Haven to Wilkesbarre. It was afterwards extended from both ends, until it reached in 1843 its present length from Phillipsburg, New Jersey, to Union Junction, Pa., 105 miles. This railroad and the Lehigh Valley follow the course of the Lehigh river, but on opposite sides. The total length of its main line and branches was 152.35 miles in 1871, when it was leased by the Central Railroad of New Jersey.

The Delaware, Lackawanna and Western Railroad Company, whose road is an outlet of the Wyoming region, was formed by the consolidation, under an act passed March 11, 1853, of the Liggitt's Gap Railroad, chartered April 7, 1832, and the Delaware and Cobb's Gap Railroad, chartered April 7, 1849. The present title was adopted April 13, 1853. The road was opened from Scranton to Great Bend, October 20, 1851, and the whole line, from the Delaware river at Manunka Chunk to Great Bend, 115 miles long, was completed May 27, 1856. Its original gauge was 6 feet, but in 1876 it was altered to the standard gauge, 4 feet 8½ inches. The total length of the main line and branches, at the close of 1876, including connections to New York City, was 658.15 miles. Its president is Samuel Sloan of New York.

The Delaware and Hudson Canal Company, whose railroad is an outlet of the Wyoming region, was chartered by the Legislature of New York, April 23, 1823, to build a canal from Rondout on the Hudson river to Honesdale, Pa., which was completed in October,

1828. The railroad from the canal at Honesdale to the mines at Carbondale was opened in 1829. It was a gravity railroad, about 16 miles long from the mines to the canal; but the road made a loop and ran back again a part of that distance, thus making its total length 29 miles when constructed. Over this railroad the first locomotive in America ran August 8, 1829, the *Stourbridge Lion.* The possessions of this company have been greatly extended, their railroads now reaching to Rouse's Point, in the northern part of New York, on the Canadian border. The total length of the main line and branches at the close of 1876 was 611.60 miles. Its president is Thomas Dickson of Scranton.

The Pennsylvania Coal Company's railroad, which leads from the Wyoming region, extends from Hawley to Port Griffith, 47 miles. It was begun in 1848, and completed in May, 1850. It is a gravity railroad, consisting of inclined planes, and is operated by stationary engines. This company owns a branch railroad from Hawley, Pa., to Lackawaxen, N. Y., 15.87 miles long, which is leased to the Erie Railway Company. John Ewen is president, and George A. Hoyt, vice-president, New York.

The Central Railroad of New Jersey, an outlet of the Lehigh and Wyoming regions, was chartered in New Jersey February 22, 1849. It was a consolidation of the Elizabeth and Somerville Railroad, chartered February 9, 1831, to build a road 25 miles long, which was completed in March, 1839, and the Somerville and Easton Railroad, chartered February 26, 1847, to build a road 39 miles long and to purchase the former road; ten miles of the new road had been built when the consolidation was made. The railroad was completed to Phillipsburg July 2, 1852. It now runs from Jersey City to Phillipsburg, where the main line ends, 73.4 miles long; and its leased lines, the Lehigh and Susquehanna Railroad and branches, run thence to Union Junction, Luzerne county, Pa. The total length of this railroad and its branches at the close of 1876 was 359.67 miles. Its president is E. C. Knight of Philadelphia.

Several railroads built for general traffic and not mainly dependent upon the transportation of coal deserve detailed mention.

The Northern Central Railway Company is a consolidation of the Baltimore and Susquehanna, York and Maryland, and York and Cumberland railroads, under charters granted by Maryland March 10, 1854, and by Pennsylvania May 3, 1854, taking effect January 1, 1855. The Baltimore and Susquehanna Railroad, chartered February 13, 1828, built 25 miles of road from Baltimore to the State line, completing it in 1838. The York and Maryland Railroad, chartered March 14, 1832, built 22 miles of road from York to the Baltimore and Susquehanna Railroad, completing it in 1838. The York and Cumberland Railroad, chartered April 21, 1846, built 25 miles of road from York to Bridgeport, opposite Harrisburg, completing it in 1851. The Susquehanna Railroad, which was chartered April 14, 1851, authorized to extend from Harrisburg to

Sunbury, 50 miles, was completed by the Northern Central in 1858. Other roads were leased by the Northern Central until in 1876 its line extended from Baltimore, Md., to Canandaigua, N. Y., broken only by a gap of 40 miles between Sunbury and Williamsport, where the tracks of the Philadelphia and Erie Railroad were used by permission of that company. The total length of the railroad and its branches at the close of 1876 was 317.47 miles. Its president is Thomas A. Scott of Philadelphia.

The Philadelphia and Erie Railroad Company was chartered April 3, 1837, under the name of the Sunbury and Erie Railroad Company, and was required to commence the construction of the road by June 1, 1838, to complete 200 miles in seven years, and the whole road in nine years. After various delays and extensions of time, construction commenced in 1852; on December, 1859, it reached Warren, and the whole line was opened to Erie October 17, 1864. On January 1, 1862, prior to its completion, it was leased to the Pennsylvania Railroad Company. The length of the road from Sunbury to Erie is 287.51 miles. Its president is Robert Thompson of Philadelphia.

The Cumberland Valley Railroad Company was chartered April 2, 1831, and in 1837 opened its road from Harrisburg to Chambersburg, where it connected with the Franklin Railroad, chartered in 1832, and opened to Hagerstown, Md., in 1839. It purchased the Franklin Railroad in 1865. In 1873 the road was extended to the Potomac river. The length of the road and branches in 1876 was 153.38 miles. Its president is Thomas B. Kennedy of Chambersburg

The Allegheny Valley Railroad Company was chartered April 14, 1851, and opened a road to Kittanning, 44 miles from Pittsburgh, in 1856, reaching Oil City, 132 miles from Pittsburgh, in 1865. The Low Grade or Bennett's Branch division, from Red Bank on the Allegheny to Driftwood on the Susquehanna, 110 miles, was opened June 1, 1874. The total length of the line and branches at the close of 1876 was 260.5 miles. Its president is John Scott of Pittsburgh.

The Philadelphia, Wilmington and Baltimore Railroad Company was formed February 5, 1838, by the consolidation of the Philadelphia and Delaware Counties Railroad, chartered in Pennsylvania April 2, 1831; the Wilmington and Susquehanna Railroad, chartered in Delaware January 18, 1832; the Maryland and Delaware Railroad, chartered in Maryland in 1831; and the Baltimore and Port Deposit Railroad chartered in Maryland in December, 1831. The entire line between Philadelphia and Baltimore was opened in 1838, and was at first laid with a continuous wooden stringer and a flat iron rail. The total length of the road and branches at the close of 1876 was 197.72 miles. Its president is Isaac Hinckley of Philadelphia.

The North Pennsylvania Railroad Company was chartered April 8, 1852, as the Philadelphia, Easton and Water Gap Railroad Company, and the name was changed to its present title October 3, 1852.

It was originally intended to build a line to Waverly, but it terminates at Bethlehem, 55.6 miles from Philadelphia. The road was opened July 7, 1857. On May 1, 1876, the Delaware River branch was opened from Jenkintown to Yardleyville, 20.5 miles, which now forms a portion of a line to New York called the Bound Brook Route, the other links in the line being the Delaware and Bound Brook Railroad and the Central Railroad of New Jersey. At the close of 1876 the total length of this railroad and its branches was 108.30 miles. Its president is Franklin A. Comly of Philadelphia.

The Pennsylvania Railroad Company.—The most extensive and the most important railroad corporation in the country is the Pennsylvania Railroad Company. In spite of many obstructions interposed in behalf of the State system, which it was believed this road would injure, the company was incorporated under an act passed April 13, 1846, which authorized it to build a railroad to connect with the Harrisburg, Portsmouth, Mount Joy and Lancaster Railroad, and to run to Pittsburgh or any other place in the county of Allegheny, or to Erie, as might be deemed most expedient. The Harrisburg, Portsmouth, Mount Joy and Lancaster Railroad Company was chartered June 9, 1832. Morgan, in his *Annals of Harrisburg*, says "the first locomotive with a train of cars came to Harrisburg from Portsmouth (Middletown), over the Harrisburg and Lancaster Railroad, in September, 1836. It was called the *John Bull.* It was hauled by canal from Columbia to Portsmouth, and there put on the railroad, then only completed between Harrisburg and Portsmouth. In October, 1837, the whole line was finished." The act of incorporation of the Pennsylvania Railroad Company also provided that in case the company should have $3,000,000 subscribed and $1,000,000 actually paid into its treasury, and have fifteen miles of its road under contract for construction at each terminus of its road prior to the 30th of July, 1847, a law granting the right of way to the Baltimore and Ohio Railroad from Cumberland, Md., to Pittsburgh should be null and void. These conditions were complied with, and on February 25, 1847, Governor Shunk granted a charter to the company. He issued a proclamation on August 2, 1847, declaring the privileges granted to the Baltimore and Ohio Railroad abrogated. Sipes's *Pennsylvania Railroad* says the grading of the first twenty miles of the road west of Harrisburg was let on July 16, 1847, and fifteen miles east of Pittsburgh on July 22, 1847. During that year the city of Philadelphia subscribed $2,500,000 to the stock of the company, and in 1848 Allegheny county subscribed $1,000,000. Work on the eastern end was vigorously pushed, and on September 1, 1849, the first division, extending from Harrisburg to Lewistown, 61 miles, was opened for business. On June 6, 1850, it was completed to Huntingdon. On September 17, 1850, the line was opened to the Mountain House, one mile east of Hollidaysburg, where connection was made with the Allegheny Portage Railroad, then owned and operated by the State.

On the 10th of December, 1852, the line from Johnstown, the western terminus of the Portage Railroad, to Pittsburgh, was completed, and cars ran through from Philadelphia to Pittsburgh, using the Portage Railroad, with its inclined planes, over the mountains. On February 15, 1854, the company completed its mountain division, using no inclined planes and stationary engines, and abandoned the use of the Portage Railroad. Between Harrisburg and Altoona the heaviest grade is 21 feet per mile. Ascending the Alleghenies, the heaviest grade is 95 feet per mile on straight lines and 82 feet on curves. The summit of the Alleghenies is crossed through a tunnel, 2,161 feet above the level of the sea and 3,612 feet in length. The height of the earth above the tunnel is 210 feet. The highest grade west of the tunnel is 52.8 feet per mile, and the average is 26.4 feet. The length of the line from Harrisburg to Pittsburgh is 249 miles; from Philadelphia to Pittsburgh, 354 miles. John Edgar Thomson was chief engineer of the railroad, and was elected president February 2, 1852.

Upon the completion of the Pennsylvania Railroad there was direct rail communication from Philadelphia to Pittsburgh by the State railroad to Lancaster, thence by the Harrisburg, Portsmouth, Mount Joy and Lancaster Railroad to Harrisburg, and thence by the Pennsylvania Railroad to Pittsburgh. These roads were leased by the Pennsylvania Railroad Company at first, but in 1857 it purchased the main line of State railroads and canals, and in 1861 leased the Harrisburg, Portsmouth, Mount Joy and Lancaster Railroad for 999 years. It thus virtually became the owner of the entire line. In 1858 Thomas A. Scott, who had been superintendent of the Western division of the railroad, was appointed general superintendent, which office he held until 1860 when he was elected vice-president. He introduced sleeping cars upon the road in 1859. The first Pullman sleeping car was built at Bloomington, Illinois, in that year. From the opening of the Pennsylvania Railroad a tax was imposed upon all tonnage carried over it until 1861, when the Legislature removed it. This tax was originally for the benefit of the State line of improvements with which the Pennsylvania Railroad competed for freight and passengers. When the company bought the main line of improvements it agreed to pay $7,500,000 for it and $1,500,000 additional to be relieved of the tonnage and other specified taxes, but the Supreme Court decided that the act relieving the company from these taxes on payment of $1,500,000 was unconstitutional, and the whole matter was held in abeyance until 1861, when an act was passed for the commutation of the tonnage tax, and the company paid under its provisions $13,570,000 for the main line and the repeal of the tax. The cost of the main line, $7,500,000, was paid in bonds of the company, bearing 5 per cent. interest, and payable $100,000 yearly until July 31, 1890, and after that date $1,000,000 annually until payment in full. The roads leased by this company have given it the control of about 1,500 miles of railroad in the State of Pennsylvania, and about 3,500 miles out of the State. The railroads once operated by the Camden and Amboy Railroad Company between Philadelphia and New York are now all under the control of the Pennsylvania Railroad, having been leased in 1871. West of Pittsburgh, its leased lines are operated by the Pennsylvania Company, a corporation in which the Pennsylvania Railroad Company controls the greater part of the stock. In the month of June, 1876, a railway trip "across the continent," from the Atlantic ocean to the Pacific, was completed in the remarkably short time of 83 hours 59 minutes and 16 seconds—less than 3½ days. The following record of this unequaled achievement belongs properly to a history of the Pennsylvania Railroad.

Left Jersey City, on the west bank of the Hudson river, opposite New York City, at 12.53 A.M., railroad time, June 1st, by way of the Pennsylvania Railroad and its connections; arrived at Pittsburgh at 10.58 A.M. same day; Chicago, at 10 P.M. same day; Council Bluffs, at 10 A.M. on 2d inst.; Ogden, at 10.30 A.M. on 3d inst.; and San Francisco, at 9.29 A.M. 4th inst., or 12 o'clock 32 minutes, New York time.

Distance from New York to San Francisco, miles	3,317
Number of hours from New York to San Francisco	83 h. 59 m. 16 s.
Average speed per hour, miles	39⅔
Distance from New York to Pittsburgh, run without a single stop, on Pennsylvania Railroad, miles	444
Number of hours from New York to Pittsburgh, Pennsylvania Railroad	10 h. 5 m.
Average speed per hour, on Pennsylvania Railroad, miles	44
Maximum speed on Pennsylvania Railroad per hour, miles	62
Minimum speed on Pennsylvania Railroad per hour, miles	25
Average speed on Pittsburgh, Fort Wayne and Chicago Railway per hour, miles	48
Average speed on Chicago and Northwestern Railway per hour, miles	45

After 22 years of service as president, John Edgar Thomson died on the 27th of May, 1874, and Thomas A. Scott was elected president, which position he still holds.

General Railroad Statistics.—In 1846, when the Pennsylvania Railroad was projected, there were 840 miles of railroad in the State, against 4,930 miles in the United States, or 17 per cent. of the whole mileage of the country. At the close of 1876 there were 5,983 miles, of which 115 miles were added in 1876, a year of very great depression; and the total length of the railroads of the United States at the close of 1876 was 77,470 miles. The percentage of the whole mileage in Pennsylvania was 7¾. In 1835 the State possessed 318 miles within its borders, or more than one-fourth of the whole extent then in the United States. In 1876, although it possesses only one-thirteenth of the railroads of the United States, only one State exceeded it in the length of its railroads—Illinois, which had 7,285 miles. Fulton and Greene were the only counties in Pennsylvania that contained no railroads in 1876.

Potter and Sullivan counties had the lowest mileage, only seven miles having been constructed in each up to the close of 1876. Luzerne county contained the greatest mileage, 382¼ miles, not including second tracks and sidings.

The following table shows the comparative railroad development in each State of the Union in 1876, based upon the areas of the States.

STATES AND TERRITORIES.	Area in square miles. Census of 1870.	Miles of railroad in operation in 1876.	Number of sq. miles of area to one mile of railroad.
Alabama	50,722	1,738	29
Arizona	113,916	....	....
Arkansas	52,198	788	66
California	188,981	1,919	98
Colorado	104,500	957	109
Connecticut	4,750	918	5
Dakota	148,932	275	548
Delaware	2,120	285	7
Florida	59,268	484	122
Georgia	58,000	2,306	25
Idaho	86,294	....	....
Illinois	55,410	7,285	8
Indiana	33,809	4,003	8
Indian Territory	68,991	279	247
Iowa	55,045	3,939	14
Kansas	81,318	2,238	36
Kentucky	37,680	1,475	26
Louisiana	41,346	539	77
Maine	35,000	1,000	35
Maryland and Dist. of Columbia	11,188	1,107	10
Massachusetts	7,800	1,837	4
Michigan	56,451	3,395	17
Minnesota	83,531	2,020	41
Mississippi	47,156	1,044	45
Missouri	65,350	3,146	21
Montana	145,776	....	....
Nebraska	75,995	1,150	66
Nevada	104,125	680	153
New Hampshire	9,280	940	10
New Jersey	8,320	1,601	5
New Mexico	121,201	....	....
New York	47,000	5,525	8½
North Carolina	50,704	1,570	32
Ohio	39,964	4,687	8½
Oregon	95,274	251	379
Pennsylvania	46,000	5,983	8
Rhode Island	1,306	189	7
South Carolina	34.000	1,353	25
Tennessee	45,600	1,645	28
Texas	274,356	2,085	132
Utah	84,476	515	164
Vermont	10,212	810	13
Virginia	38,348	1,649	23
Washington Territory	69,994	110	636
West Virginia	23,000	584	39
Wisconsin	53,924	2,707	20
Wyoming	97,883	459	213
Total	3,026,494	77,470	39

Street Railroads.—The names, locations, and lengths of the city passenger railways in Pennsylvania are as follows:

NAMES OF COMPANIES.	Miles of road.
Allentown	3.44
Central, Pittsburgh	2.75
Central, Reading	2.20
Citizens', Philadelphia	9.50
Citizens', Pittsburgh	5.00
Coalville, Wilkesbarre	2.87
Continental, Philadelphia	9.50
Easton and South Easton	1.37
Empire, Philadelphia	8.00
Erie City	2.14
Federal Street and Pleasant Valley, Pittsburgh	2.60
Frankford and Southwark, Philadelphia	16.75
Germantown, Philadelphia	31.00
Green and Coates Streets, Philadelphia	7.00
Harrisburg City	2.05
Hestonville, Mantua and Fairmount, Philadelphia	20.00
Lombard and South Streets, Philadelphia	8.00
Manayunk and Roxborough Inclined Plane, Philadelphia	5.50
People's Street, Luzerne County	9.50
People's, Philadelphia	6.00
Philadelphia City	9.62
Philadelphia and Darby	5.05
Philadelphia and Gray's Ferry	10.37
Pittsburgh, Allegheny and Manchester	4.75
Pittsburgh and Birmingham	3.25
Pittsburgh, Oakland and East Liberty	6.00
Pittston	1.50
Reading City	2.50
Ridge Avenue, Philadelphia	15.00
Riverside, Northumberland county (unfinished)	....
Schuylkill River, Philadelphia	3.11
Second and Third Streets, Philadelphia	37.00
Seventeenth and Nineteenth Streets, Philadelphia	7.50
South Side, Pittsburgh	2.21
Stroudsburg	1.37
Thirteenth and Fifteenth Streets, Philadelphia	10.50
Union, Philadelphia	41.00
Union, Warren	.56
West End, Philadelphia	15.00
West Philadelphia	19.00
Wilkesbarre and Kingston	4.12
Williamsport	2.05
Total miles of main track, not including sidings	356.63

Street railroads for the conveyance of passengers are now found in all the principal cities of Pennsylvania, and their use dispenses with the lines of omnibuses which at one time partially supplied the demand for cheap conveyance in large cities. John Stephenson says that New York constructed the first street passenger railroad, in 1832—the Fourth avenue railway. Steam was used on its entire length in 1835, but the explosion of a boiler caused the steam cars to be discontinued in the city, though they have continued in use on the upper part of the road leading out of the city. The steam motors were placed in advance of the street cars in the place of horses. They were made by Wm. T. Ames, an iron founder and machinist of New York. John Stephenson, a prominent omnibus builder, constructed the first street car. Since that time he has made street cars a specialty, supplying not only a very great part of those used in the United States, but also exporting them all over the world. About 1857 the Fifth and Sixth street railway was started in Philadelphia, being the first street railroad in Pennsylvania. Since that time such roads have multiplied rapidly. They are laid with flat iron rails rolled with a flange on the outside edge, and made of wagon gauge, 5 feet 2 inches, so that wagons can also run on them. Horses are almost universally used to pull the cars, but in 1877 steam cars were successfully operated on the Market street railway, in Philadelphia, the noise of escaping steam and the discomfort of clouds of smoke having been obviated by skillful contrivances. These steam cars have only been used experimentally, six of them having been running throughout the year, while all the other cars of the same company were drawn by horses. It is believed that all the difficulties attending the use of steam for street cars are substantially overcome, and that steam will soon be substituted for horses on the leading street railways.

The Transportation of Coal Oil.—In recent years a novel system of transportation has grown up, which, however, is exclusively used for oil. Lines of wrought iron pipes have been laid all through the petroleum region, connecting every well with some common reservoir whence the oil is transhipped in tank cars to its destination by railroad. The report of the Second Geological Survey of Pennsylvania states that the number of miles of pipe laid is perhaps 3,000. The experiment was first tried at Titusville in 1861, but the line was imperfectly constructed, the pipes leaked badly, and the project was laid aside until 1865, when Samuel Vansyckle conceived the idea of extending the tubing of a well to a station on the railroad, and laid a line of 2-inch tubing six miles long, from Pit Hole to Miller Farm. It was a success, and others soon followed his example; companies were organized to lay pipe and transport oil, and now pipe lines are among the regular transportation companies of the State.

From the foregoing sketch of the transportation systems of Pennsylvania it will be seen that this great State has always been in the van in matters affecting the material interests of its people. But little more than two hundred years have passed since the settlement of the State began, and in that short time its natural aspect of affairs has been almost wholly changed. The dense forests have been leveled or else pierced with convenient roads; the broad rivers and rapid torrents have everywhere been bridged; mountains have not been removed, but man's ingenuity has laughed at their silent attempt to bar his further progress. It has no valley so deep that modern civilization has not found an effectual way to get into and out of it with ease. It has no mountain so high that engineering skill has not devised a practical method of scaling its summit without relying on brute power. Pennsylvania was the first State to construct a stone turnpike—the Philadelphia and Lancaster Turnpike, finished in 1794; the first to undertake a canal one hundred miles long—the Schuylkill Navigation, begun in 1815; the second to build a railroad with an iron track—the Mauch Chunk Railroad, built in 1827; the first to use steam in navigation—Fitch's steamboat, the *Perseverance*, making regular trips on the Delaware river, between Philadelphia and Burlington, in 1788; the first to successfully experiment with a locomotive—the *Stourbridge Lion*, on the Carbondale Railroad, in 1829; and the first to attempt the passage of a mountain range by a canal or a railroad—the Portage Railroad, finished in 1833. Before 1825 the entire State from east to west was traversed by several stone turnpikes, involving the expenditure of an immense sum of money for those days; yet the people of Pennsylvania were not deterred from undertaking a still more expensive work just fifty years ago—the construction of the extensive lines of internal improvements, which in their inception were regarded as the greatest works that had until then been attempted on the Western Continent. No railroad engineer at that time had sufficient experience to know how to cross a high mountain without the use of inclined planes, but nowhere in the world were these planes worked so skillfully as they were in Pennsylvania. Engineers visited our State works from all parts of the world, and the information derived from their study aided greatly in the rapid advance of civil engineering skill. But the progressive spirit of Pennsylvania was not satisfied with the end accomplished in the passage of the Alleghenies and the connection of all parts of the State by the public works. A desire for more rapid means of communication sprung up, even when the public works were in their infancy. The establishment of railroad lines was boldly undertaken by private corporations, and so widely did these enterprises spread that before the State system of internal improvements had seen its twenty-first birthday a rival of no mean pretensions stretched its iron limbs alongside, from the eastern part of the State to the Ohio river, crossing the Allegheny mountains without a break in its continuous line of communication. Thus has Pennsylvania advanced without a pause in the great work of opening lines of communication within its borders. Recognizing the necessity for each successive improvement, it has proceeded regardless of cost, until to-day it stands pre-eminent among the States in these sublime achievements of modern progress.

RAILROAD STATISTICS OF PENNSYLVANIA.

The following interesting tables, illustrating the present railroad system of this State, have been specially prepared for this report by John O. Keim, of Reading.

COUNTIES.	Projected	Main and br'ch.	2d and side track.	Total track in miles	COUNTIES.	Projected	Main and br'ch.	2d and side track	Total track in miles
Adams	10	27	8	45	Lancaster	20	174¾	43¼	238
Allegheny	9	169½	105	283½	Lawrence	....	49¾	9¼	59
Armstrong	10	44	10½	64½	Lebanon	15	57	35½	107½
Beaver	....	56	23½	79½	Lehigh	20	116½	89¼	225¾
Bedford	7	89¼	31	127¼	Luzerne	10	382¼	235	627¼
Berks	75	157¾	86¾	319½	Lycoming	47	89½	30½	167
Blair	....	105¾	72	177¾	M'Kean	5	101¼	16¾	123
Bradford	....	128½	44	172½	Mercer	....	158½	40¼	198¾
Bucks	17	58½	39½	115	Mifflin	....	65½	57	122½
Butler	10	59	11¾	80¾	Monroe	41	36	40	117
Cambria	....	45	54½	99½	Montgomery	20	109½	71¼	200¾
Cameron	....	54	19	73	Montour	....	29	5½	34½
Carbon	10	125	112	247	Northampton	35	70½	75½	181
Centre	46	75½	13¾	135¼	Northumberland	....	144¾	53½	198¼
Chester	50	218½	99¼	367¾	Perry	....	32	40	72
Clarion	....	60½	21	81½	Philadelphia	14	90¼	111	215¼
Clearfield	....	72½	10	82½	Pike	30	39¾	32	101¾
Clinton	....	67	15	82	Potter	32	7	½	39½
Columbia	....	62	13	75	Schuylkill	....	282¾	225	507¾
Crawford	....	128	36½	164½	Snyder	14	26½	4	44½
Cumberland	9	93	15	117	Somerset	....	71¼	11¼	82½
Dauphin	15	111½	89¼	215¾	Sullivan	23	7	¾	30¾
Delaware	10	61½	36	107½	Susquehanna	....	97	55½	152½
Elk	....	74	21	95	Tioga	20	84	13¼	117¼
Erie	....	129	81	210	Union	10	30½	4	44½
Fayette	8	77½	16	101½	Venango	20	136	34	190
Forest	....	15	4	19	Warren	....	119	34	153
Franklin	30	63¼	8	101¼	Washington	30	66	12½	108½
Fulton	25	....	....	25	Wayne	....	60¾	36	96¾
Greene	25	....	....	25	Westmoreland	....	160½	99½	260
Huntingdon	12	85¼	48¾	146	Wyoming	....	52½	28¾	81¼
Indiana	....	26½	5	31½	York	....	144½	56¾	201¼
Jefferson	....	36	8	44	Grand total,				
Juniata	....	12	15	27	January 1, 1877,	784	5679¾	2774¼	9238

City passenger railways, aggregating (branches and side tracks included) 429 miles, and the underground railroads in the anthracite coal regions, approximating 425 miles, are not included.

In preparing the above table, it of course became necessary to ascertain the names and lengths of the various railroads which traverse each county, together with the lengths of the proposed railroads by which each county will be intersected if existing projects become realities, and this data possesses so much interest that we append it:

COUNTIES.	Projected.	Main.	Sid'gs	Total.
ADAMS COUNTY.				
Hanover Junc., Hanover & Gettysburg R. R.	10	17	5	32
Littlestown, Frederick Div., Penna. R. R.		10	3	13
	10	27	8	45
ALLEGHENY COUNTY.				
Allegheny Valley, and Plum Creek Branch		22	19	41
Chartiers Div., Pittsburgh, Cin. & St. Louis		8	½	8½
Edgewood (to Hampton coal fields)		1	½	1½
Lawrenceville and Evergreen (Narrow-guage)		2½	1	3½
Little Saw Mill Run (to Banksville)		3	1	4
Pennsylvania Railroad (Main Line)		16	30	46
Pittsburgh and Connellsville Div., B & O. R. R.		21	10	31
Pittsburgh and Castle Shannon (Narrow-guage)	9	6	1	16
Pittsburgh, Cincinnati and St. Louis		18	8	26
Pittsburgh, Fort Wayne and Chicago (Penna. Co.)		17	14	31
Pittsburgh, Virginia and Charleston		26	7	33
Western Pennsylvania Div., Pennsylvania Railroad		29	13	42
	9	169½	105	283½
ARMSTRONG COUNTY.				
Allegheny Valley, River, and Low Grade Divisions		35½	10	45½
Bostonia Junction Branch		6		6
Parker and Karns City (Narrow-guage)		2½	½	3
Shenango and Allegheny	10			10
	10	44	10½	64½
BEAVER COUNTY.				
Cleveland and Pittsburgh (Penna. Co.)		15	2	17
New Castle and Beaver Valley (Penna. Co.)		3	1	4
New Galilee Branch (Penna. Co.)		6	½	6½
Pittsburgh, Fort Wayne and Chicago (Penna. Co.)		32	20	52
		56	23½	79½
BEDFORD COUNTY.				
Bedford and Bridgeport R. R. and Dunning's Creek Br., (10½ m.,) Bedford Div., P. R. R.		49¼	15	64¼
Huntingdon and Broad Top Mountain		24	12	36
Pittsburgh and Connellsville Div., B. & O. R. R.		12	3	15
Six Mile Run Br., and Sandy Run Br., H. & B. T. M.		4	1	5
Southern Pennsylvania	7			7
	7	89¼	31	127¼
BERKS COUNTY.				
Allentown (Kutztown Br.), P. & R R. R.	17	4½	½	22
Berks and Lehigh Br., P. & R. R. R.		27	3	30
Catasauqua and Fogelsville		3	1	4
Colebrookdale Br., P. & R. R. R.		11½	2	13½
East Pennsylvania Br., P. & R. R. R.		22	16	38
Lebanon Valley do. do.		17½	14	31½
Moselem do. do.		1¾		1¾
Oley Valley (Narrow-guage)	13			13
Perkiomen Br., P. & R. R. R.		¼		¼
Philadelphia and Reading (Main Line)		35	45	80
Reading Br., W. & N. R. R.		7		7
Reading and Columbia		6	2	8
Reading Branch, South Mountain	20			20
South Mountain (Main Line)	25			25
West Reading Branch, P. & R. R. R.		2	¼	2¼
Wilmington and Northern (Main Line)		20¼	3	23¼
	75	157¾	86¾	319½

COUNTIES.	Projected.	Main.	Sid'gs	Total.
BLAIR COUNTY.				
Bald Eagle Valley Br., Penna. R. R.	....	4¾	½	5¼
Bell's Gap (Narrow-guage)	....	8½	1	9½
Hollidaysburg Branch, Penna. R. R.	....	53½	10	63½
Newry do. do.	....	1	....	1
Pennsylvania (Main Line)	....	34	60	94
Tyrone and Clearfield Div., Penna. R. R.	....	4	½	4½
	....	105¾	72	177¾
BRADFORD COUNTY.				
Barclay	....	16¼	6	22¼
Elmira and Williamsport, Elmira Div., N. C. Ry.	....	35	8	43
Pennsylvania and New York Canal and R. R.	....	48½	29	77½
Penna. and New York Connections at Athens	....	11¾	....	11¾
State Line and Sullivan	....	17	1	18
	....	128½	44	172½
BUCKS COUNTY.				
Delaware River Branch, N. P. R. R. (Bound Brook Route)	....	14½	4	18½
Delaware and Lancaster	17	....	....	17
Doylestown Branch, North Penna. R. R.	....	7	1	8
North Pennsylvania (Main Line)	....	17	16	33
Northeast Pennsylvania Br., North Penna. R. R.	....	4	½	4½
Philadelphia, Newtown and N. Y.	....	2	....	2
Philadelphia and Trenton Div., Penna. R. R.	....	14	18	32
	17	58½	39½	115
BUTLER COUNTY.				
Butler Extension, Western Pennsylvania (P. R. R.)	....	21	8	29
Parker and Karns City (Narrow-gauge)	....	23	¾	23¾
Shenango and Allegheny	10	15	3	28
	10	59	11¾	80¾
CAMBRIA COUNTY.				
Ebensburg and Cresson Br., Penna. R. R.	....	11	½	11½
Pennsylvania Railroad (Main Line)	....	34	54	88
	....	45	54½	99½
CAMERON COUNTY.				
Allegheny Valley, Low Grade Division	....	9	5	14
Buffalo, New York and Philadelphia	....	8	2	10
Philadelphia and Erie Div., Penna. R. R.	....	37	12	49
	....	54	19	73
CARBON COUNTY.				
Beaver Meadow Div., L. V. R. R.	....	21½	5	26½
Gravity—Switchback—C. R. R. of N. J.	....	10	....	10
Lehigh and Eastern	10	....	....	10
Lehigh and Susquehanna Div., C. R. R. of N. J.	....	32	48	80
Lehigh Valley Railroad (Main Line)	....	35	50	85
Mahanoy Division, L. V. R. R.	....	15	3	18
Nesquehoning Valley Branch, C. R. R. of N. J.	....	11½	6	17½
	10	125	112	247
CENTRE COUNTY.				
Bald Eagle Valley Br., Penna. R. R.	....	38	8	46
Bellefonte and Snow Shoe	....	21½	3¾	25¼
Lewisburg, Centre and Spruce Creek	46	....	....	46
Tyrone and Clearfield Div., Penna. R. R.	....	16	2	18
	46	75½	13¾	135¼

COUNTIES.	Projected.	Main	Sid'gs	Total.
CHESTER COUNTY.				
Cedar Hollow (Lime Road)	....	3	....	3
Chester Valley Br., P. & R. R. R	....	16	2	18
Delaware and Lancaster	20	....	....	20
East Brandywine and Waynesburg Br., Penna. R. R	....	23	4	27
Peachbottom (Narrow-gauge)	....	8	¼	8¼
Pennsylvania (Main Line)	....	36	60	96
Pennsylvania and Delaware Br., Penna. R. R	....	34	1½	35½
Philadelphia and Baltimore Central	....	26¾	3½	30¼
Philadelphia and Chester County	16	....	....	16
Philadelphia and Reading (Main Line)	....	10	20	30
Pickering Valley Br., P. & R. R. R	....	11	½	11½
Port Kennedy Branch, do.	....	1¼	¼	1½
West Chester Br., West Chester and Philad'a	....	9	½	9½
West Chester and Philadelphia	....	4	1	5
West Chester and Phœnixville	14	....	....	14
Wilmington and Northern	....	34	5½	39½
Wilmington and Western	....	2½	¼	2¾
	50	218½	99¼	367¾
CLARION COUNTY.				
Allegheny Valley—River Division	....	22	13	35
do. do. Low Grade Division	....	28	6	34
Sligo Branch, A. V. R. R	....	10½	2	12½
	....	60½	21	81½
CLEARFIELD COUNTY.				
Allegheny Valley, Low Grade Division	....	19	4	23
Moshannon Branch and Dunbar Branch, Penna. R. R	....	14½	....	14½
Tyrone and Clearfield Div., Penna. R. R	....	39	6	45
	....	72½	10	82½
CLINTON COUNTY.				
Bald Eagle Valley Br., Penna. R. R	....	9	2	11
Philadelphia and Erie Div., Penna. R. R	....	58	13	71
	....	67	15	82
COLUMBIA COUNTY.				
Bloomsburg Div., D. L. & W. R. R	....	20	5	25
Catawissa and Williamsport Br., P. & R. R. R	....	17	2	19
Danville, Wilkesbarre and Hazleton Div., Penna. R. R	....	17	4	21
Mahanoy Division, Lehigh Valley	....	8	2	10
	....	62	13	75
CRAWFORD COUNTY.				
Atlantic and Great Western	....	41	18	59
Dunkirk, Allegheny Valley and Pittsburgh	....	2	½	2½
Erie and Pittsburgh, Penna. Co	....	27	6	33
Franklin Branch, Atlantic and G. Western R. R	....	9	....	9
Franklin Division, Lake Shore and Michigan Southern	....	6	....	6
Pittsburgh, Titusville and Buffalo Ry	....	20	8	28
Union and Titusville Br., P. T. & B	....	23	4	27
	....	128	36½	164½
CUMBERLAND COUNTY.				
Cumberland Valley	....	41	10	51
Dillsburg Branch, Cumberland Valley	....	6	½	6½
Harrisburg and Potomac & Ore Branch	9	21	2½	32½
Northern Central	....	7	....	7
South Mountain Iron Company, C. V. R. R	....	18	2	20
	9	93	15	117

COUNTIES.	Projected.	Main.	Sid'gs	Total.
DAUPHIN COUNTY.				
Columbia Branch, Penna. R. R.	....	4	....	4
Lebanon Valley Br., P. & R. R. R.	....	15	23	38
Lykens Valley Branch, S. B. R. R.	....	1½	....	1½
Northern Central	....	27	10	37
Pennsylvania (Main Line)	....	25	40	65
Schuylkill and Susquehanna Br., P. & R. R. R	....	19	6	25
South Mountain	15	....	....	15
Summit Branch Railroad	....	20	10¼	30¼
	15	111½	89¼	215¾
DELAWARE COUNTY.				
Chester Creek Br., P. & B. C. R. R.	....	7¼	1	8¼
Pennsylvania (Main Line)	....	8	12	20
Philadelphia and Baltimore Central	....	10	3	13
Philadelphia and Chester Br., P. & R. R. R.	....	3¼	....	3¼
Philadelphia and Chester County	10	....	....	10
Philadelphia, Wilmington and Baltimore	....	13	18	31
West Chester and Philadelphia	....	20	2	22
	10	61½	36	107½
ELK COUNTY.				
Allegheny Valley, Low Grade Division	....	20	4	24
Earley Branch, Penna. R. R.	....	13	2	15
Philadelphia and Erie Div., Penna. R. R.	....	41	15	56
	....	74	21	95
ERIE COUNTY.				
Atlantic and Great Western	....	20	9	29
Buffalo, Corry and Pittsburgh	....	6	....	6
Erie and Pittsburgh (Penna. Co.)	....	12	4	16
Lake Shore and Michigan Southern	....	44	50	94
Pittsburgh, Titusville and Buffalo Ry	....	7	2	9
Philadelphia and Erie Div., Penna. R. R.	....	38	16	54
Union and Titusville Br., P. T. & B. Ry	....	2	....	2
	....	129	81	210
FAYETTE COUNTY.				
Fayette Branch, P. and Connellsville	....	14	1½	15½
Mount Pleasant Branch, do.	....	5	....	5
Pittsburgh and Connellsville Div., B. & O. R. R.	....	39	11½	50½
Southwest Pennsylvania Div., Penna. R. R.	....	19½	3	22½
Uniontown and West Virginia	8	....	....	8
	8	77½	16	101½
FOREST COUNTY.				
Pittsburgh, Titusville and Buffalo	....	15	4	19
FRANKLIN COUNTY.				
Cumberland Valley	....	27	5	32
Harrisburg and Potomac	30	....	....	30
Mont Alto	....	10½	1¼	11¾
Southern Pennsylvania, Cumberland Valley	....	23¼	1¾	25
Southern Pennsylvania Ore Bank	....	2	....	2
Western Maryland	....	½	....	½
	30	63¼	8	101¼
FULTON COUNTY.				
Southern Pennsylvania	25	....	....	25
GREENE COUNTY.				
Pittsburgh, Virginia and Charleston	15	....	....	15

COUNTIES.	Projected	Main.	Sid'gs	Total.
Waynesburg and Washington (Narrow-gauge)	10	....	....	10
	25	....	....	25
HUNTINGDON COUNTY.				
East Broad Top (Narrow-gauge)	....	30	5¼	35¼
Huntingdon and Broad Top Mountain	....	21	8½	29½
Lewisburg, Centre and Spruce Creek	12	....	....	12
Pennsylvania Railroad (Main Line)	....	25	35	60
Shoup's Run Br., H. & B. T. M.	....	9¼	....	9¼
	12	85¼	48¾	146
INDIANA COUNTY.				
Indiana Branch, Penna. R. R.	....	19	3	22
Western Pennsylvania Div., Penna. R. R.	....	7½	2	9½
	....	26½	5	31½
JEFFERSON COUNTY.				
Allegheny Valley, Low Grade Division	....	36	8	44
JUNIATA COUNTY.				
Pennsylvania Railroad (Main Line)	....	12	15	27
LANCASTER COUNTY.				
Columbia Branch, Penna. R. R.	....	29	3	32
Columbia and Port Deposit Br., Penna. R. R.	....	25	....	25
Delaware and Lancaster	20	....	....	20
East Brandywine and Waynesburg Br., Penna. R. R.	....	4½	....	4½
Lancaster and Quarryville Branches, P. & R. R. R.	....	23¾	3	26¾
Mount Hope Branch, P. & R. R. R.	....	2½	....	2½
Peachbottom (Narrow-gauge)	....	10	¼	10¼
Pennsylvania Railroad (Main Line)	....	46	32	78
Reading and Columbia	....	34	5	39
	20	174¾	43¼	238
LAWRENCE COUNTY.				
Erie and Pittsburgh (Penna. Co.)	....	12	4	16
Lawrence Railroad (Penna. Co.)	....	9	1	10
Newcastle and Beaver Valley (Penna. Co.)	....	12	3	15
Newcastle and Franklin	....	13	½	13½
Newcastle Railroad and Mining Company	....	3¾	¾	4½
	....	49¾	9¼	59
LEBANON COUNTY.				
Cornwall Railroad	....	7½	3½	11
Lebanon and Tremont Br., P. & R. R. R.	....	17	10	27
Lebanon Valley do. do. do.	....	21½	18	39½
Schuylkill and Susquehanna, do. do.	....	11	4	15
South Mountain	15	....	....	15
	15	57	35½	107½
LEHIGH COUNTY.				
Berks and Lehigh Br., P. & R. R. R.	....	16	1¼	17¼
Catasauqua and Fogelsville	....	22½	7	29½
East Pennsylvania Br., P. & R. R. R.	....	14	20	34
Ironton	....	11	2	13
Lehigh and Susquehanna Div., C. R. R. of N. J.	....	9	15	24
Lehigh Valley (Main Line)	....	24	40	64
North Pennsylvania do.	....	4	2	6
Perkiomen Br., P. & R. R. R.	....	12¼	2	14¼
Slatedale Branch, L.V. R. R.	....	3¾	....	3¾
South Mountain	20	....	....	20
	20	116½	89¼	225¾

COUNTIES.	Projected.	Main.	Sid'gs	Total.
LUZERNE COUNTY.				
Beaver Meadow Div., L.V. R. R.	....	47¼	....	47¼
Bloomsburg Div., D. L. & W. R. R.	....	43	5	48
Danville, Hazleton and Wilkesbarre Div., Penna. R. R.	....	10	2	12
Delaware and Hudson Canal Co.'s Railway	....	31½	12	43½
Delaware, Lackawanna and Western	....	35	45	80
Gravity Branch, D. & H. C.	....	27½	13¾	41¼
Jefferson Branch (Erie Railway)	....	5	4	9
Lehigh and Eastern	10	....	....	10
Lehigh and Susquehanna Div., C. R. R. of N. J.	....	38	45	83
Sandy Run	....	10½	....	10½
Lehigh Valley (Main Line)	....	30	50	80
Nanticoke Br., C. R. R. of N. J.	....	20¼	....	20¼
Nescopec Branch, do. do.	....	9	....	9
Pennsylvania Coal Company	......	30	38	68
Pennsylvania and New York Canal and R. R.	....	19	18	37
Penna. & N. Y. Canal and R. R. Branches	....	11¼	....	11¼
Springbrook Br., C. R. R. of N. J.	....	8½	¼	8¾
Tresckow Br., C. R. R. of N. J.	....	6½	2	8½
	10	382¼	235	627¼
LYCOMING COUNTY.				
Catawissa and Williamsport Br., P. & R. R. R.	....	17½	4	21½
Elmira and Williamsport Div., N. C. Ry.	....	35	6	41
Jersey Shore, Pine Creek and Buffalo	37	....	....	37
Muncy Creek	10	7	½	17½
Philadelphia and Erie Div., P. R. R.	....	30	20	50
	47	89½	30½	167
McKEAN COUNTY.				
Buffalo, Bradford and Pittsburgh Br., Erie Ry.	....	28	4	32
Buffalo, New York and Philadelphia	....	27	4	31
Jersey Shore, Pine Creek and Buffalo	5	....	....	5
McKean and Buffalo	....	22¼	2¾	25
Philadelphia and Erie Div., Penna. R. R.	....	16	6	22
Wilcox and Howard Hill Improvement	....	8	....	8
	5	101¼	16¾	123
MERCER COUNTY.				
Atlantic and Great Western	....	22	20	42
Erie and Pittsburgh (Penna. Co.)	....	30	6	36
Franklin Branch, Atlantic and G. Western Ry.	....	2	....	2
Jamestown and Franklin Br. of Lake Shore and Michigan Southern	....	26	10	36
Mahoning Division, Atlantic and G. Western Ry.	....	10	....	10
Newcastle and Franklin	....	23	1	24
Sharon Branch, Atlantic and Great Western	....	12	¼	12¼
Shenango and Allegheny	....	32	3	35
Stoneboro' Branch, Jamestown and Franklin	....	1½	....	1½
	....	158½	40¼	198¾
MIFFLIN COUNTY.				
Mifflin and Centre County, Lewistown Div., Penna. R. R.	....	12½	6	18½
Pennsylvania Railroad (Main Line)	....	36	50	86
Sunbury and Lewistown, Lewistown Div., P. R. R.	....	17	1	18
	....	65½	57	122½
MONROE COUNTY.				
Delaware, Lackawanna and Western	....	36	40	76
Lehigh and Eastern	30	....	....	30
Lehigh and Lackawanna	11	....	....	11
	41	36	40	117

COUNTIES.	Projected.	Main.	Sid'gs	Total.
MONTGOMERY COUNTY.				
Chester Valley Br., P. & R. R. R.	....	5½	1	6½
Colebrookdale do. do. do.	....	1¼	¼	1½
Delaware and Lancaster	20	....	....	20
Delaware River Branch, Bound Brook Route	....	6	1	7
Doylestown Branch, North Penna. R. R.	....	3¼	½	3¾
Germantown and Norristown Br., P. & R. R. R.	....	7	10	17
North Pennsylvania (Main Line)	....	19	23	42
Northeast Pennsylvania Br., N. P. R. R.	....	5½	½	6
Pennsylvania Railroad (Main Line)	....	2	4	6
Perkiomen Br., P. & R. R. R.	....	26	3	29
Philadelphia and Reading (Main Line)	....	14½	25	39½
Plymouth Br., P. & R. R. R.	....	9½	2	11½
Stony Creek Br., North Penna. R. R.	....	10	1	11
	20	109½	71¼	200¾
MONTOUR COUNTY.				
Bloomsburg Div., D. L. & W. R. R.	....	9	1	10
Catawissa and Williamsport Br., P. & R. R. R.	....	18	4	22
Danville, Wilkesbarre and Hazleton Div., P. R. R.	....	2	½	2½
	....	29	5½	34½
NORTHAMPTON COUNTY.				
Coplay Branch, C. R. R. of N. J	....	1	....	1
Delaware, Lackawanna and Western	....	8	10	18
Lehigh and Lackawanna Br., C. R. R. of N. J	10	15	1½	26½
Lehigh and Susquehanna Div., C. R. R. of N. J.	....	26	35	61
Lehigh Valley (Main Line)	....	12	20	32
North Pennsylvania (Main Line)	....	7	9	16
Shimersville Branch, North Penna. R. R.	....	1½	....	1½
South Mountain	25	....	....	25
	35	70½	75½	181
NORTHUMBERLAND COUNTY.				
Bloomsburg Div., D. L. & W. R. R.	....	8	3	11
Catawissa and Williamsport Br., P. & R. R. R.	....	4	1	5
Danville, Wilkesbarre and Hazleton Div. Penna. R. R.	....	15	4	19
Mahanoy and Shamokin Br., P. & R. R. R.	....	42	8	50
Mine Hill and Schuylkill Haven Br., P. & R. R. R.	....	5½	5	10½
Northern Central	....	19	8	27
Philadelphia and Erie Div., P. R. R.	....	24	15	39
Shamokin Valley and Pottsville Br., N. C. R. R.	....	27¼	9½	36¾
	....	144¾	53½	198¼
PERRY COUNTY.				
Northern Central	....	1	....	1
Pennsylvania Railroad (Main Line)	....	30	40	70
Schuylkill and Susquehanna Br., P. & R. R. R.	....	1	....	1
	....	32	40	72
PHILADELPHIA COUNTY.				
Chestnut Hill Br., P. & R. R. R.	....	4	1	5
Connecting Br., Penna. R. R.	....	7¼	....	7¼
Delaware Extension, do.	....	3¾	4¾	8½
Frankford and Holmesburg Br., Penna. R. R.	....	4	1	5
Germantown and Norristown Br., P. & R. R. R.	....	13	16	29
Northern Liberties and Penn Township Br., P. & R. R. R.	....	1½	....	1½
North Pennsylvania (Main Line)	....	8½	14	22½
Pennsylvania (Main Line)	....	8	16	24
Philadelphia and Chester Br., P. & R. R. R., and Junction R. R.	....	7	1	8
Philadelphia and Chester County	14	....	....	14

COUNTIES.	Projected.	Main.	Sid'gs	Total.
Philadelphia, Newtown and New York	....	4	....	4
Philadelphia and Reading (Main Line)	....	7	16	23
Philadelphia and Trenton Div., Penna. R. R	....	12½	28	40½
Philadelphia, Wilmington and Baltimore	....	5	10	15
Southwark Br., P. W. & B. R. R	....	1¾	1¼	3
West Chester and Philadelphia	....	3	2	5
	14	90¼	111	215¼
PIKE COUNTY.				
Erie (Main Line)	....	25	30	55
Hawley Branch (Erie Railway)	....	14¾	2	16¾
Lehigh and Eastern	30	....	....	30
	30	39¾	32	101¾
POTTER COUNTY.				
Buffalo, New York and Philadelphia	....	7	½	7½
Jersey Shore, Pine Creek and Buffalo	32	....	....	32
	32	7	½	39½
SCHUYLKILL COUNTY.				
Catawissa and Williamsport Br., P. & R. R. R	....	24½	2	26½
East Mahanoy Br., P. & R. R. R	....	10½	3½	14
Lebanon and Tremont Br., P. & R. R. R	....	27	10	37
Little Schuylkill do. do. do.	....	28¼	27½	55¾
Mahanoy Division, Lehigh Valley	....	30	5	35
Mahanoy and Shamokin Br., P. & R. R. R	....	22½	10	32½
Mill Creek 3¾ (Colliery Br. 5¼) do. do.	....	9	12½	21½
Mine Hill and Schuylkill Haven Br., P. & R. R. R	....	37	60	97
Mount Carbon do. do. do.	....	8½	....	8½
Mount Carbon and Port Carbon do. do. do.	....	2½	13½	16
Nesquehoning Valley Branch, C. R. R. of N. J	....	5	3	8
Panther Creek Br., P. &. R. R. R	....	3	....	3
Peoples' Railroad	....	6	½	6½
Philadelphia and Reading	....	32	50	82
Schuylkill and Susquehanna Br., P. & R. R. R	....	26	8	34
Schuylkill Valley do. do. do.	....	11	19½	30½
	....	282¾	225	507¾
SNYDER COUNTY.				
Selinsgrove and North Branch	14	....	....	14
Sunbury and Lewistown, Lewistown Div., P. R. R	....	26½	4	30½
	14	26½	4	44½
SOMERSET COUNTY.				
Buffalo Valley	....	8¼	....	8¼
Pittsburgh and Connellsville Div., B. & O. R. R	....	51	11	62
Salisbury Branch, B. & O. R. R	....	2¾	....	2¾
Somerset and Mineral Point	....	9¼	¼	9½
	....	71¼	11¼	82½
SULLIVAN COUNTY.				
Muncy Creek	23	....	....	23
State Line and Sullivan	....	7	¾	7¾
	23	7	¾	30¾
SUSQUEHANNA COUNTY.				
Delaware, Lackawanna and Western	....	28	29	57
Erie (Main Line)	....	17	22	39
Jefferson Branch (Erie Railway)	....	33	4	37
Montrose (Narrow-gauge)	....	19	½	19½
	....	97	55½	152½

COUNTIES.	Projected.	Main.	Sid'gs	Total.
TIOGA COUNTY.				
Blossburg and Arnot Br., Tioga R. R.	....	6	....	6
Corning, Cowanesque and Antrim	....	37	3	40
Cowanesque Branch	....	11	1	12
Jersey Shore, Pine Creek and Buffalo	20	....	....	20
Tioga Railway	....	30	9¼	39¼
	20	84	13¼	117¼
UNION COUNTY.				
Catawissa and Williamsport Br., P. & R. R. R.	....	11½	3	14½
Lewisburg, Centre and Spruce Creek Br., Penna. R. R.	10	19	1	30
	10	30½	4	44½
VENANGO COUNTY.				
Allegheny, Kennerdell and Clintonville	20	....	....	20
Allegheny Valley Railroad	....	46	13	59
Cherry Run Br., P. T. & B.	....	3	....	3
Franklin Branch, Atlantic and G. Western	....	22	2	24
Jamestown and Franklin Div., Lake Shore and Michigan Southern	....	25	8	33
Pittsburgh, Titusville and Buffalo	....	33	11	44
Pithole Valley Railroad	....	7	....	7
	20	136	34	190
WARREN COUNTY.				
Atlantic and Great Western	....	9	4	13
Dunkirk, Allegheny Valley and Pittsburgh	....	46	5	51
Pittsburgh, Titusville and Buffalo	....	20	8	28
Philadelphia and Erie Div., P. R. R.	....	44	17	61
	....	119	34	153
WASHINGTON COUNTY.				
Chartiers Div., Pittsburgh, Cincinnati and St. Louis	....	16	1	17
Pittsburgh, Cincinnati and St. Louis	....	17	8	25
Pittsburgh, Virginia and Charleston	29	5	3	37
Washington and Waynesburg (Narrow-gauge)	1	10	....	11
Wheeling, Pittsburgh and Baltimore Div., B. & O. R. R.	....	18	½	18½
	30	66	12½	108½
WAYNE COUNTY.				
Delaware and Hudson Canal Co.'s R. R.	....	5	3	8
Gravity Branch, D. & H. C.	....	28½	12	40½
Hawley Br., Erie Railway	....	1¼	....	1¼
Honesdale Branch, Erie Railway	....	9	1	10
Pennsylvania Coal Company's Railway	....	17	20	37
	....	60¾	36	96¾
WESTMORELAND COUNTY.				
Allegheny Valley, River Division	....	12	2	14
Greenlick (Narrow-gauge)	....	3½	....	3½
Ligonier Valley (Narrow-gauge)	....	10	....	10
Mt. Pleasant Branch, Pittsburgh and Connellsville	....	5	½	5½
Pennsylvania Railroad (Main Line)	....	53	83	136
Pittsburgh and Connellsville Div., B. & O. R. R.	....	19	6	25
Southwest Pennsylvania Div., Penna. R. R.	....	19	3	22
Western Pennsylvania Div., Penna. R. R.	....	29	5	34
Youghiogheny	....	10	....	10
	....	160½	99½	260
WYOMING COUNTY.				
Delaware, Lackawanna and Western	....	8	8¼	16¼
Montrose (Narrow-gauge)	....	8	½	8½
Pennsylvania and New York Canal and R. R.	....	36½	20	56½
	....	52½	28¾	81¼

COUNTIES.	Projected.	Main.	Sid'gs	Total.
YORK COUNTY.				
Bachman Valley Br., Hanover J., H. & G.	....	9	¼	9¼
Dillsburg Br., Cumberland Valley R. R.	....	2	....	2
Hanover Junction, Hanover and Gettysburg	....	13	2	15
Hanover and York Branch, Frederick Div., Penna. R. R	....	32	4	36
Northern Central	....	49½	49½	99
Peachbottom (Narrow-gauge)	....	39	1	40
	....	144½	56¾	201¼

The following railroad companies, embracing 208 railroads and branches, under 60 different companies and managements, possessed railroad lines in Pennsylvania in 1876. In as many cases as possible the dates of charters and completions have been procured. When consolidated from other companies, the date of the charter of the oldest company among them embraced in this State is given.

OWNED, CONTROLLED, OR LEASED.	NAME OF COMPANY.	Length of main line of road laid in miles.	Length of main line of road laid in miles in Penn'a.	Chartered	Open'd in whole or in part.
	Allegheny Valley.	242.00	242.00	1851	1856
	Plum Creek Branch	8.00	8.00		
	Sligo Branch	10.50	10 50		
	Bostonia Junction	6.00	6.00		
Philadelphia & Reading.	Allentown	4.50	4 50	1853	
	Atlantic and Great Western.	387.50	92.42	1857	1860
	Franklin Branch	33.00	33.00		
	Mahoning Division	88.00	10.00	1848	1851
Hanover H. J. & Gettysb'g	Bachman Valley	9.00	9.00		
Pennsylvania	Bald Eagle Valley	51.19	51.19	1860	1864
	Barclay Coal Company	16.23	16.23	1854	1856
Pennsylvania	Bedford and Bridgeport	38.70	38.70	1870	1872
	Dunning's Creek Branch	10.50	10.50		
	Bellefonte and Snow Shoe	21.50	21.50	1859	1860
	Bell's Gap. (Narrow Gauge).	8.50	8 50		1873
	Buffalo, Corry & Pittsburgh.	43.20	6.00		1866
Pittsburgh & Connellsv'le	Buffalo Valley	8.12	8.12		
	Buffalo, New York & Phila	120.55	41.90		1871
	Catasauqua and Fogelsville.	20.00	20.00	1855	1856
	Trexlertown Branch	5 50	5.50		
Philadelphia & Reading	Catawissa	94.00	94.00	1831	1854
Pittsb'gh, Cin. & St. Louis.	Chartiers	22 80	22.80	1853	1856
Phila. & Baltimore Cent'l.	Chester Creek.	7 25	7.25	1865	1867
Philadelphia & Reading	Chester and Delaware River.	4.10	4.10		1875
do. do.	Chester Valley	21.50	21.50	1850	1853
	Cedar Hollow (Lime R'd).	3.00	3.00		
do. do.	Chestnut Hill	4 13	4.13	1832	1854
Pennsylvania Co	Cleveland and Pittsburgh	167.00	15 00	1850	1852
Philadelphia & Reading	Colebrookdale	12.80,	12.80		
Pennsylvania	Columbia and Port Deposit.	34.80	25.00	1865	1876
do.	Connecting	6.74	6.74	1865	1867
	Corning, Cowanesque, and Antrim	53.00	37.16		1873
	Cowanesque Branch	11 00	11.00		
	Cornwall	7.47	7.47		
	Cumberland Valley.	82 20	68.30	1831	1837
Pennsylvania	Danville, Hazleton, and Wilkesbarre	45.00	45.00	1859	1872
	Delaware and Hudson Canal Company's Railway	53 26	36.65	1823	1829
	Gravity Branch	56.00	56.00		
	Delaware, Lackawanna and Western	115 00	115.00	1832	1851
	Bloomsburg Division	80.00	80.00		
Cumberland Valley	Dillsburg & Mechanicsburg.	8.00	8.00	1870	1873
	Dunkirk, Allegheny Valley, and Pittsburgh	90.60	48.30		
Pennsylvania	East Brandywine & Waynesburg	27:50	27.50	1854	1863
	East Broad Top. (Narrow Gauge.)	30.00	30.00	1856	1874
Philadelphia & Reading	East Mahanoy	7.54	7 54	1854	
	Colliery Branches	3 00	3 00		
do. do.	East Pennsylvania	36 00	36.00	1856	1859

OWNED, CONTROLLED, OR LEASED.	NAME OF COMPANY.	Length of main line of road laid in miles.	Length of main line of road laid in miles in Penn'a.	Chartered	Open'd in whole or in part.
Pennsylvania	Ebensburg and Cresson	11.00	11.00	1859	1869
do.	Edgewood	1.00	1.00		
Northern Central	Elmira and Williamsport	78 00	70.00	1832	1854
	Erie	460 03	42.15	1832	1841
	Buffalo, Bradford, and Pittsburgh Branch	28.00	28.00		
	Hawley Branch	16 00	16.00		
	Honesdale Branch	9 00	9.00		
Pennsylvania	Erie and Pittsburgh	81 00	81 00	1858	1862
Pittsburgh & Connellsv'le	Fayette County	14.00	14.00	1858	1860
Pennsylvania	Frankford and Holmesburg	4.16	4 16	1868	1870
	Green Lick (Narrow Gauge).	3.50	3.50	1874	1876
	Hanover Junction, Hanover and Gettysburg	30.00	30 00	1847	1852
Pennsylvania	Hanover and York Railroad.	32 50	32.50	1874	1875
	Harrisburg and Potomac	21.00	21.00		
	Huntingdon and Broad Top Mountain	45.00	45 00	1852	1856
	Shoup's Run	9 25	9.25		
	Six Mile Run	4.50	4.50		
	Ironton	11 00	11.00		
Lake Shore and Mich. S'n	Jamestown and Franklin	51.10	51.10	1862	1867
	Stoneboro Branch	1 50	1.50		
Erie	Jefferson	38.00	38.00		1872
Pennsylvania	Junction	3.67	3.67		
	Lake Shore & Mich. South'n	540.37	44 06	1833	1852
	Franklin Division (J. & P. Branch)	36 09	6.00		
Pennsylvania	Lawrence	17.98	9.36	1864	1867
	Lawrenceville & Evergreen, (Narrow Gauge)	2 61	2 61		1873
Central Railroad of N. J.	Lehigh and Lackawanna	15 00	15 00		1867
do. do. do.	Lehigh and Susquehanna	105.00	105 00	1837	1840
	Coplay Branch	1.00	1.00		
	Gravity (Switch Back)	10.00	10.00		
	Nanticoke Branch	20 25	20.25		
	Nescopec Branch	9.00	9 00		
	Sandy Run Branch	10.50	10.50		
	Lehigh Valley	161.00	100.75	1846	1855
	Beaver Meadow Division and Coal Spurs	72 86	72.86		
	Mahanoy Division	57.00	57.00		
	Slatedale Branch	3.75	3.75		
Pennsylvania	Lewisburg, Centre & Spruce Creek	18.60	18.60	1853	
	Ligonier Valley (Nar.-gauge).	10.20	10.20		
	Little Saw Mill Run	3 00	3.00		
Pennsylvania	Littlestown	9 50	9 50		1871
Philadelphia & Reading.	Little Schuylkill Navigation	28 20	28 20		
	Panther Creek	3.00	3 00		
	McKean and Buffalo	22 15	22 15		1874
Pennsylvania	Mifflin and Centre County	12.50	12.50	1865	1868
Philadelphia & Reading	Mill Creek & Mine Hill Nav.	3 78	3.78		
	Colliery Branches	5.25	5.25		
do. do.	Mine Hill & Schuy'll Haven.	42 50	42.50	1828	1831
Cumberland Valley	Mont Alto	10.50	10.50		1872
	Montrose (Narrow Gauge)	28 00	28 00		1873
Philadelphia & Reading	Mount Carbon & Port Carbon	2.50	2.50	1842	1844
Pittsburgh & Connellsv'le	Mount Pleasant & Broad Ford	9.60	9.60	1869	1871
	Muncy Creek	7 50	7.50		
Central Railroad of N. J.	Nesquehoning Valley	16.50	16.50		1870
	New Castle R.R & Mining Co.	3.75	3.75		
Pennsylvania	New Castle & Beaver Valley.	14.97	14.97	1856	1860
	New Castle and Franklin	36.25	36.25		
do.	Newry	1.10	1.10	1866	1869
	Northern Central	137 75	102 15	1828	1838
North Pennsylvania	Northeast Pennsylvania.	9.80	9.80		1872
	North Pennsylvania	55.60	55.60	1852	1857
	Delaware River Branch (Bound Brook)	20.50	20.50		
	Doylestown Branch	10.30	10.30		
	Shimersville Branch	1.80	1.80		
	Peach Bottom (Nar'w Gauge)	60.00	60.00		
	Parker and Karns City and Karns City and Butler (Narrow Gauge)	25.50	25.50		
	Pennsylvania (including H. P. M. J. & L. R. R)	382 20	382.20	1846	1854
	Bloomfield Branch	3.00	3.00		
	Columbia Branch	27.00	27.00		
	Delaware Extension	7 30	7 30		
	Earley Branch	13.00	13.00		

OWNED, CONTROLLED, OR LEASED.	NAME OF COMPANY.	Length of main line of road laid in miles.	Length of main line of road laid in miles in Penn'a.	Chartered	Open'd in whole or in part.
	Hollidaysburg Branch	9.60	9.60		
	Indiana Branch	19.00	19 00		
	Morrison's Cove Branch	18.40	18.40		
	Penna. and Del. Branch	38.40	34 00		
	Springfield Branch	9.00	9.00		
	Sunbury and Lewistown	43 30	43.30	1869	1871
	Tyrone Branch	3.10	3.10		
	Williamsburg Branch	13.40	13.40		
	Pennsylvania Coal	47.00	47.00		
	Pennsylvania and New York Canal and Railroad	104.55	104.55	1867	1869
	Connections at Athens	11 75	11.75		
	Mill Creek Branch	2.61	2 61		
	Mineral Spring Branch	1.60	1.60		
	Plainsville Branch	.50	.50		
	Pleasant Valley Branch	6.18	6.18		
	West Pittston	1.23	1.23		
	People's	6 05	6 05		
Philadelphia & Reading	Perkiomen	38 50	38 50	1865	1875
	Phila. & Baltimore Central	46 00	36.75	1852	1860
Pennsylvania	Philadelphia and Erie	287.51	287.51	1837	1864
Philadelphia & Reading	Philadelphia, Germantown, and Norristown	17.00	17.00	1831	1835
	Germantown Branch	3 00	3.00		
	Philadelphia and Reading	98 40	98 40	1833	1838
	Lebanon Valley	53.70	53.70		
	Lebanon and Tremont	42.20	42.20		
	Mahanoy and Shamokin	64.60	64 60		
	Mount Carbon	8.50	8 50		
	Moselem	1.70	1.70		
	Northern Liberties and Penn Township	1.40	1.40		
	Phila. & Chester Branch	4.00	4.00		
	Port Kennedy	1.20	1.20		
	Schuy'll & Susquehanna	53.40	53.40		
	West Reading	1.90	1 90		
Pennsylvania	Phila., Newtown & New York	6.10	6.10		
do.	Philadelphia and Trenton	26.60	26.60	1832	1834
	Philadelphia, Wilmington & Baltimore	94 91	17.81	1831	1838
Philadelphia & Reading	Pickering Valley	11.30	11 30	1869	1871
	Pithole Valley	7.00	7.00		
	Pittsburgh & Castle Shannon (Narrow Gauge)	6.00	6.00		
	Pittsburgh, Cincinnati, and St. Louis	192.30	35.10	1849	1858
Baltimore & Ohio	Pittsburgh and Connellsville	146.50	143.80	1837	1870
Pennsylvania Co	Pittsburgh, Fort Wayne and Chicago	468.30	48.80	1848	1859
	New Galilee Branch	6.00	6.00		
	Pittsburgh, Titusville and Buffalo	95 00	95.00	1862	1866
	Cherry Run	3 00	3.00		
	Union and Titusville	25.00	25.00		
	Pittsburgh, Virginia and Charleston	30.00	30.00	1870	1873
Philadelphia & Reading	Plymouth	9.25	9.25		
do. do.	Reading and Columbia	40.00	40.00	1857	1864
	Lancaster Branch	8.00	8.00		
	Quarryville Branch	15.75	15.75		
	Mount Hope Branch	2.50	2 50		
Philadelphia & Reading	Reading and Lehigh	43.25	43 25	1870	1874
Pittsburgh & Connellsv'le	Salisbury	2.46	2.46		
Philadelphia & Reading	Schuylkill Valley Navigation and Railroad Co	11.00	11.00	1828	1830
Northern Central	Shamokin Val'y & Pottsville	27.30	27.30	1826	1832
Atlantic & Great Western	Sharon	8.00	8 00		1876
	Sharpsville Branch	4.00	4.00		
	Shenango and Allegheny	45.50	45.50		
	Somerset and Mineral Point	9.10	9 10		
Cumberland Valley	South Mountain Iron Co	17.78	17.78		1869
do. do.	Southern Pennsylvania	21.00	21.00	1870	
	Ore Bank Branch	2.00	2.00		
Philadelphia, Wilmington, and Baltimore	Southwark	1 72	1.72		
Pennsylvania	Southwest Pennsylvania	37.30	37.30	1871	1873
Central Railroad of N. J.	Springbrook	8.50			
	State Line and Sullivan	24.00	24 00		
North Pennsylvania	Stony Creek	10 30	10.30		1874
	Summit Branch	20 00	20.00	1830	1839
	Lykens Valley Branch	1.50	1.50		

OWNED, CONTROLLED, OR LEASED.	NAME OF COMPANY.	Length of main line of road laid in miles.	Length of main line of road laid in miles in Penn'a.	Chartered	Open'd in whole or in part.
	Tioga	30.60	30.60	1828	1840
	Blossburg Branch	4.00	4.00		
Central Railroad of N. J.	Tresckow	6.50	6.50		1870
Pennsylvania	Tyrone and Clearfield	44.04	44.04	1853	1864
	Goss Run	2.60	2.60		
	Mapleton	2.21	2.21		
	Moshannon	9.89	9.89		
	Phillipsburg	3.83	3.83		
West Chester and Phila.	West Chester	9.00	9.00	1831	1832
	West Chester & Philadelphia	26.30	26.30	1848	1854
	Western Maryland	90.00	.50		
Pennsylvania	Western Pennsylvania	57.10	57.10	1853	1865
	Pittsburgh Branch	29.00	29.00		
Baltimore and Ohio	Wheeling, Pittsburgh, and Baltimore	32.00	18.00	1850	1857
	Wilcox and Howard Hill Improvement Co.	8.00	8.00		
	Wilmington and Northern	63.60	52.00		
	Reading Branch	7.00	7.00		
	Wilmington and Western	20.00	2.39		
	Waynesburg & Washington (Narrow Gauge)	10.00	10.00		
	Youghiogheny	10.00	10.00		
		8,287.47	5,679.98		

The aggregate length of completed railroads in Pennsylvania to September 1, 1877, was 5,679.98 miles, to which add uncompleted portions of roads operating part of main line, and we have:

Main and Branch (not including second or side track) in operation September 1, 1877,	5,679.98 miles.
Roads part in operation and partly graded,	304 "
Total given in Poor's *Manual*, 1877,	5,983.98 miles.

Following are the names of roads partly graded, etc., of which portions of main line are operated:

NAME OF COMPANY.	Length of uncompleted portions in miles.	Chartered to construct road to
Allentown	17.00	Port Clinton.
Hanover Junction, Hanover and Gettysburg	10.00	Maryland State Line.
Harrisburg and Potomac	39.00	Waynesboro.
Lewisburg, Centre and Spruce Creek	68.00	Tyrone.
Lehigh and Lackawanna	21.00	Stroudsburg.
Muncy Creek	33.00	Bernice.
Pittsburgh and Castle Shannon	9.00	Finleyville.
Pittsburgh, Virginia and Charleston	44.00	Maryland State Line.
Shenango and Allegheny	20.00	Brady's Bend.
Southern Pennsylvania	32.00	Bedford.
Waynesburg and Washington	11.00	Washington.
	304.00 miles.	

We add to the foregoing statistics by Mr. Keim the statement that, according to Poor's *Manual* for 1877–78, the total capital stock of the railroads of the United States at the close of 1876 was $2,248,358,375, and the total funded debt was $2,220,233,560: total capital account, $4,468,591,935. The total capital stock of the railroads of Pennsylvania at the same time was $285,991,797, and the total funded debt was $308,388,800: total capital account, $594,380,597. Comparing these aggregates, we find that the railroads of Pennsylvania have cost 13 per cent. of all the railroads of the United States.

POST 58, G. A. R.

PERIODICALS AND TELEGRAPHS.

Periodicals.—The first newspaper printed in America was issued at Boston, September 25, 1690, by Richard Pierce, printer, and Benjamin Harris, publisher. It was called *Publick Occurrences, both Foreign and Domestick*, and was designed to be issued once a month, or oftener "if any glut of occurrences happen." It was immediately suppressed by the authorities. It was succeeded under more favorable auspices by the *Boston News Letter*, published by John Campbell, which appeared April 24, 1704, and was regularly issued thereafter down to the Revolution. It was followed by the *Boston Gazette*, issued December 21, 1719, by William Brooker, and by the *New England Courant*, issued August 7, 1721, by James Franklin, elder brother of Benjamin Franklin. The first newspaper in Philadelphia was the *American Weekly Mercurie*, issued December 22, 1719, by Andrew Bradford. In 1728 Samuel Keimer established the second newspaper in Philadelphia, which he named the *Universal Instructor in all the Arts and Sciences, and Pennsylvania Gazette.* Benjamin Franklin is, however, entitled to the credit of having conceived the idea of establishing the newspaper to which Keimer gave the long name, Franklin's plan having been communicated to Keimer by a treacherous printer. In 1729, however, Franklin obtained control of the paper, and continued its publication for many years under the title simply of the *Pennsylvania Gazette.* Under this name its publication was continued under various publishers until 1804, when it ceased to exist. All of the early newspapers above mentioned, and others which soon followed them, were published weekly. There was no daily newspaper in America until after the close of the Revolution, but as early as 1776 a newspaper called the American *Daily Advertiser* was published in Philadelphia twice a week. In 1784 Claypoole, the publisher of the *Advertiser*, commenced to issue it daily, and this was the beginning of daily newspapers in this country. The *North American* is its lineal descendant. On the 29th of July, 1786, the first newspaper printed west of the Allegheny mountains was issued at Pittsburgh by John Scull and Joseph Hall, and named the *Pittsburgh Gazette.*

For the dissemination of information by means of daily and weekly newspapers and other periodicals Pennsylvania occupies a high position among her sister States, although the wide popularity in some other States of the co-operative plan of publishing newspapers has the effect of giving to her in respect to population fewer newspapers than they possess. This plan, against which every true journalist must instinctively protest, has never been popular in Pennsylvania, and it is a subject of congratulation that it has not been. To have a weekly newspaper printed wholly or partly in Chicago, New York, or at some enterprising printing-office in New England, and have that newspaper dated a thousand miles away and distributed from the place at which it is dated as if actually printed there, may not be an imposition upon the purchaser and reader of such a publication, if he knows what he is buying and reading, but it certainly is an offense to American journalists and an aspersion upon the honor and ability of legitimate American journalism which it does not merit and has done nothing to provoke. Only an insignificant number of Pennsylvania newspapers are printed and edited upon this co-operative plan, while many other States are flooded with such publications. We subjoin a complete list of all the daily, tri-weekly, semi-weekly, weekly, bi-weekly, semi-monthly, monthly, bi-monthly, and quarterly periodicals in all the States in 1877, with their population in 1870, showing the relative position of Pennsylvania. For this excellent table we are indebted to the courtesy of N. W. Ayer and Son, the widely-known advertising agents, of Philadelphia.

Population.	STATES.	Daily.	Tri-Weekly.	Semi-Weekly.	Weekly.	Bi-Weekly.	Semi-Monthly.	Monthly.	Bi-Monthly.	Quarterly.	Total.
996,992	Alabama	5	......	......	79	......	2	2	......	......	88
484 471	Arkansas	6	......	......	64	......	1	......	......	......	71
582,031	California	44	1	7	186	1	2	20	1	1	263
47,164	Colorado	7	......	1	44	1	......	1	......	......	54
537,454	Connecticut	15	......	6	82	3	1	5	......	2	114
125,015	Delaware	4	......	......	14	1	......	......	......	1	20
131,700	District of Columbia.	5	......	......	13	......	......	7	......	1	26
188.248	Florida	2	......	......	25	......	......	2	......	......	29
1,184 109	Georgia	7	2	3	117	......	2	11	......	......	142
2,539.891	Illinois	50	9	5	585	2	12	65	......	4	732
1,680,637	Indiana	30	2	4	306	1	1	19	......	......	363
1,194,320	Iowa	24	3	5	382	1	1	10	......	1	427
373,299	Kansas	11	......	......	160	......	1	9	......	......	181
1,321,011	Kentucky	10	2	3	117	1	3	9	......	......	145
726,915	Louisiana	9	1	......	63	1	9	1	......	1	85
626,915	Maine	9	1	......	63	1	10	1	......	1	86
780,894	Maryland	11	......	......	89	......	......	9	......	1	110
1,457,351	Massachusetts	28	1	11	231	5	1	48	......	11	336
1,187,234	Michigan	20	2	7	265	2	2	12	......	1	311
446.056	Minnesota	5	6	......	139	......	......	4	......	......	154
827,922	Mississippi	4	2	......	92	......	......	......	......	......	98
1,721 295	Missouri	26	5	2	311	1	3	33	1	3	385
129.322	Nebraska	11	......	......	101	......	......	8	......	......	120
58.711	Nevada	12	......	3	10	......	......	......	......	......	25
318,300	New Hampshire	8	......	......	54	......	......	6	......	1	69
906,096	New Jersey	23	......	2	139	1	1	6	......	1	173
4,387,464	New York	103	4	18	715	8	25	182	8	18	1,081
1,071.361	North Carolina	7	1	3	74	......	2	5	......	......	92
2,665,260	Ohio	43	7	5	474	3	7	62	1	3	605
104,883	Oregon	5	......	......	39	......	......	1	......	......	45
3,522 050	Pennsylvania	77	2	9	529	1	13	93	2	6	732
217,353	Rhode Island	7	......	1	20	......	......	1	......	......	29
705 606	South Carolina	6	2	1	58	......	......	3	......	1	71
1,258,520	Tennessee	10	......	1	116	......	2	13	......	1	143
818,899	Texas	22	2	2	159	......	......	2	......	......	187
330,551	Vermont	3	......	1	57	1	......	2	......	......	64
1,225,163	Virginia	19	4	6	84	......	5	13	......	......	131
442.014	West Virginia	3	2	2	67	......	......	4	......	1	79
1,064,985	Wisconsin	19	2	3	233	......	1	14	......	1	273
38,387,462	Total	710	63	111	6,356	35	107	683	13	61	8,139

Taking for each State the four main points of comparison, we find that New York ranks first in all the divisions of the table. In the number of daily newspapers Pennsylvania ranks second with 77, the next highest being Illinois with 50; in the number of weekly newspapers Pennsylvania ranks third with 529, Illinois exceeding this number by 56; in the number of monthly publications Pennsylvania ranks second with 93, the next highest being Illinois with 65; in the total number of all publications Pennsylvania and Illinois both rank second, each having 732. Taking the population of the United States, according to the census of 1870, we find the newspaper publications average one to every 4,711 inhabitants, while in Pennsylvania the average is one to every 4,812.

Telegraphs.—The following table shows the extent of the telegraph lines in Pennsylvania over which a general business is transacted. These figures are obtained from the report for 1876 of the Auditor-General of the State, and they do not include private lines used by manufacturing firms between their offices and their works, nor private lines exclusively owned by railroad companies and operated for their business alone.

COMPANIES.	Miles of line.	Miles of wire.	No. of stations
American District	175	175	15
Erie County	73	219	2
Philadelphia Local	237	237	138
Philadelphia, Reading and Pottsville	884	1,999	299
Rockhill	30	30	4
Western Union	5,610	18,395	750
Total	7,009	21,055	1,208

The submarine cables in Pennsylvania are as follows: Belonging to the Philadelphia, Reading and Pottsville Telegraph Company, 500 feet; Western Union, 2 miles. The total number of miles of telegraph line in the United States in 1875 was 88,821; miles of wire, 214,085; number of stations, 8,498. As compared with the United States, Pennsylvania possesses 8 per cent. of the total mileage of telegraph line, $9\frac{5}{6}$ per cent. of the total mileage of wire, and $14\frac{1}{5}$ per cent. of the total number of stations.

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